AMERICAN DYESTUFF REPORTER

"Circulated Everywhere Dyestuffs Are Used"

Published by Howes Publishing Company, 440 Fourth Avenue, New York

Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

VOLUME XXI | FEBRUARY 29, 1932 | NUMBER 5

Progress In Bleaching, Dyeing and Finishing—A Review of Developments During 1931

By A. J. HALL, B.Sc., F.I.C., F.T.I.

This review published in the *Textile Recorder* (Manchester, England) will undoubtedly be of interest to many on this side of the water. It refers for the most part to work done in England, and for this reason may give references which have been overlooked by our own readers.

ALTHOUGH from the financial point of view the British textile industry has during the past year passed through a period of unparalleled depression, it cannot be said that the technologists connected with this great industry have slackened in their efforts to devise new processes or improve the old ones. Only a casual reference to the patent literature or journals of the scientific societies or technical press is sufficient to convince anyone of the intense research which has been applied to the processing of all kinds of woven and knitted fabrics.

In reviewing outstanding events of the year 1931, it is desirable to draw attention to the fact that right at the beginning (during the last few days of 1930, in fact) two eminent figures who have done much to assist the textile and color industries—Horace A. Lowe and Lord Melchett—passed away. Born in 1872 at Heaton Moor, Manchester, Lowe examined, while employed at Macclesfield, the action of caustic soda on cotton with a somewhat keener insight than did Mercer before him, and discovered the all-important fact that a permanent lustre on cotton yarn could be obtained only by stretching it during the alkali treatment or during the washing-off. The difficulties which attended the exploitation of this far-reaching discovery resulted in Lowe allowing his patent to lapse—he could find no English manufacturer to interest himself in the process—and later the same process was taken up in Germany successfully. Some very interesting personal reminiscences on this subject have been published by A. J. Coups (J. Soc. Dyers and Col., 1931, 47, 169).

During the past year no particular improvements have been made in the process of mercerization as usually carried out except that a number of wetting-out agents (English patents, 279,784, 350,018) suitable for addition to the alkali lye have been discovered; by the use of these agents mercerization of yarns and fabrics directly from the grey has been facilitated. But quite a large amount of attention has been devoted to the physical and chemical changes which occur in the cotton fibre during its reaction with caustic soda. Again, it has been shown (G. Champetier; Compt. rend., 1931, 192, 1593) that cotton appears to form chemical compounds with caustic soda such as $3C_6H_{10}O_5$, 2NaOH and $C_6H_{10}O_5$, NaOH, but perhaps more interesting have been the views of S. M. Neale (J. Soc. Chem. Ind., 1931, 50, 177T), which go far to suggest a clear mental picture of the manner in which molecules of alkali enter the cellulose structure and attach themselves to the cellulose micellae. It is likely that in the future technical progress will be based on such views of the effect of alkalis on the fine structure of cellulose fibres.

A modification of the Hubner iodine mercerization test has been described by W. F. A. Ermen (J. Soc. Dyers and Col., 1931, 47, 162), and this is likely to prove of considerable value since it allows production in a permanent form of a coloration of cotton fibres showing their relative degree of mercerization. Briefly, the test consists of treating the cotton fibres with a 6% iodine solution in much the usual manner, then washing until the unmercerized fibres become colorless, and plunging the whole of the fibres into a boiling solution of Indigosol 1B or 04B; after rinsing and soaping at the boil it is found that the unmercerized fibres are substantially white while the unmercerized fibres are permanently colored with Indigosol dye.

Theories of lustre in connection with mercerized cotton and rayons have been discussed by J. M. Preston (J. Soc. Dyers and Col., 1931, 47, 136).

Insoluble azo dyes such as those of the Naphthol AS type have been well in the limelight during the past year. The beginning of the year witnessed a legal decision in favor of the British Dyestuffs Corporation Ltd. in their dispute with I. G. Farbenindustrie A.-G. with regard to certain selective patents protecting the manufacture of these dyes. As a direct result there is now no hindrance to the manufacture of such dyes in this country, and, in fact, in the middle of last year British Dyestuffs Corporation Ltd. placed on the market the first green dye of this particular type—Duratol Green BA.

Naphthol AS dyes are being used in all kinds of materials where fastness to all influences is necessary and it is only to be expected that this use has drawn attention to the weak features of this class of dye. Generally, it has been found dangerous to use Naphthol AS dyed yarns in fabrics which have to undergo kier boiling; a resulting defect is that colors are liable to mark off. This feature has now been investigated by Professor F. M. Rowe (J. Soc. Dyers and Col., 1931, 47, 35 and 163), and it must now be accepted that during alkali boiling the Naphthol AS dyes are liable to decomposition. Thus the dye resulting from the combination of Fast Red RL base and Naphthol AS-RL decomposes with formation of para-anisidine and 2-methyl-4-amino-benzene-azo-beta-hydroxynaphthoic acid-para-anisidide. In these changes the reducing action of cellulose in the presence of caustic alkali plays an important part.

Numerous intermediates of value in the manufacture of improved types of Naphthol AS dyes have been discovered.

An interesting method for preparing chromium acetate as used for mordant purposes in printing has been described (H. Battegay; Bull. Soc. Ind. Mulhouse, 1930, 96, 632), the method consisting of reducing sodium bichromate with sodium bisulphite in the presence of acetic acid.

It is regretted that the Fastness Committee of the Society of Colorists and Dyers have not yet found it possible to issue their final or even preliminary recommendations as regards methods for testing the fastness to light and washing of colored fabrics. However, several valuable reports have been published dealing with the fading of dyes on exposure to light (P. W. Cunliffe; J. Soc. Dyers and Col., 1931, 47, 7, 73 and 225), and particularly the measurement of such fading; a communication has also appeared dealing with the character of perspiration (C. C. N. Vass; J. Soc. Dyers and Col., 1931, 47, 9).

A publication by A. Landolt (Textilber., 1930, 11, 937) dealing with the injury to cellulose fibres dyed with vat colors during exposure to light recalls the previous investigations on this subject by F. Scholefield (J. Soc. Dyers and Col., 1928, 44, 236). Landolt associates this injury (formation of oxycellulose) with the production of hydrogen peroxide during exposure in the presence of air and alkali of cotton dyed with certain vat dyes such as Cibanone Orange R. It is stated that even in the absence of alkali Cibanone Orange R catalytically assists the decomposition of Direct Sky Blue in mixtures of these dyes upon the fibre.

D. Mounier (Rev. Gen. Tein. Imp. Blanch. App., 1931, 9, 5 and 585) has described much of interest relating to the action of light on various dyes. It is known that nitro-dyes often tend to become browner in sunlight, and Mounier finds that this change is due to reduction of the nitro group to an azoxy group; with further reduction ortho-hydroxyazo compounds are formed, with characteristic color change. The fading of azo dyes is such as to indicate that the process is one of oxidation; at least the change of color produced by light is similar to that obtained by chemical oxidation. An interesting observation is that the decomposition products of azo dyes during fading under the influence of light are such that they protect the residual color from further fading.

In the past it has not been a simple matter to distinguish between oxycellulose and hydrocellulose in cotton fabrics, which show dyeing faults due to the presence of either of these substances, and for this reason it is frequently difficult to trace the cause of such faults, that is, whether they are due to excessive acid or oxidation treatment. R. Haller (Textilber., 1931, 12, 257) has recently described a test which enables these two degradation products of cellulose to be distinguished readily. It is carried out by immersing the cotton for 1½ hours in a cold 1% solution of stannous chloride, then rinsing and placing in a very dilute solution of gold chloride; a purple color develops on cotton containing oxycellulose, but no color occurs with hydrocellulose.

The past year has been important in so far as during that period a really satisfactory soap substitute in the form of Igepon A has become available. The properties of this substance have been fully described by J. Nusslein (J. Soc. Dyers and Col., 1931, 47, 309). It can be used equally well in acid, neutral and alkaline solutions, and is, therefore, particularly valuable in the wet processing of wool goods; furthermore, Igepon A is not affected at all by the hardest water, and, in fact, it is claimed that its scouring action is slightly better in hard than in soft water. Igepon A can also be used in finishing because of its softening properties, and a related product, Igepon T, has a substantive affinity for wool. Presumably Igepon A is a sulphonated fatty acid in which the carboxyl group has been suppressed, for it is the presence of a free carboxyl group (COOH) which renders ordinary soap susceptible to hard water.

Gardinol is another soap substitute (A. Kertress; Dyer and Calico Printer, 1931, 52, 524) which has much the same character as Igepon A; it is a sulphonated fatty alcohol.

Interest in wool has increased largely during the past year, and this is in part due to the excellent research re-

(Continued on page 175)

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

President
P. J. Wood
Oriental Silk Printing Co., Paterson, N. J.
Vice-Presidents
William H. Cady—Alex. Morrison
Treasurer
Harry R. Davies
Secretary
A. Newton Graves
Franklin Process Co., Providence, R. I.
Councilors
Ralph F. Culver — George A. Moran
H. M. Chase — Hugh Christison
William R. Moorhouse — Walter M. Scott
President Emeritus and Chairman of the Research Committee
Louis A. Olney
Lowell Textile Institute, Lowell, Mass.

Local Sections and Their Officers

Northern New England Section—
Henry D. Grimes, Chairman, Wood Worsted Mills, Lawrence, Mass.
Harold C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Rhode Island Section—
Heyward F. Lawton, Chairman, Borden & Remington Co., Providence, R. I.
C. Brian Wainwright, Secretary, Apponaug Co., Apponaug, R. I.

New York Section—
Robert H. Gaede, Chairman, Gaede Silk Dyeing Co., Paterson, N. J.
Clemens F. Hoppe, Secretary, Oriental Silk Printing Co., Haledon, N. J.

Philadelphia Section—
Charles A. Seibert, Chairman and Acting Secretary, 311 S. Riverside Walk, Penn's Grove, N. J.

Piedmont Section—
John L. Crist, Chairman, Calco Chem. Co., Inc., Charlotte, N. C.
J. D. Sandridge, Secretary, E. I. du Pont de Nemours & Co., Inc., Greensboro, N. C.

South-Central Section—
Noel D. White, Chairman, Davenport Hosiery Mills, Chattanooga, Tenn.
Andrew Kelly, Secretary, Burkart-Schier Chemical Co., Chattanooga, Tenn.

Midwest Section—
Edward W. Morgan, Chairman, Morgan Dyeing & Bleaching Co., Rochelle, Ill.
William Bergh, Jr., Secretary, Vassar Swiss Underwear Co., Chicago, Ill.

South-Eastern Section—
E. A. Feimster, Chairman, Eagle and Phenix Mills, Columbus, Ga.
Charles Ordway, Secretary, Alabama Polytechnic Institute, Auburn, Ala.

Lowell Textile Junior Section—
Joseph Pizzuto, Chairman; Raymond Matthews, Secretary.

North Carolina State College Junior Section—
R. A. Gilliam, Chairman; D. B. Hardin, Secretary.

CALENDAR OF COMING EVENTS

Meeting Northern New England Section, March 5.

* * *

Meeting New York Section, March 25.

* * *

Council and Research Committee Meetings

March 11, 1931—Providence, R. I.
April 1, 1932—Washington, D. C.
April 29, 1932—New York City.
June 3, 1932—Boston, Mass.

* * *

WINTER MEETING, SOUTHEASTERN SECTION

THE winter meeting of the Southeastern Section of the American Association of Textile Chemists and Colorists was held at the Ralston Hotel, Columbus, Ga., February 6th, 7:00 P. M. There were fifty-five members and guests present.

The Secretary protem, Charles B. Ordway, called the meeting to order, and read over the list of elected officers of the temporary section. They were confirmed by members present. The officers of this Southeastern Section of A. A. T. C. C. are as follows for 1932:

E. A. Fiemster, Jr., Chairman (Eagle & Phenix Mills, Columbus, Ga.).

Charles B. Ordway, Secretary, Alabama Polytechnic Institute, (Auburn, Ala.)

H. H. Field, Treasurer (Eagle & Phenix Mills, Columbus, Ga.).

The meeting was then turned over to Mr. E. A. Fiemster, Jr., as elected Chairman.

Mr. E. A. Fiemster, Jr., Chairman, called the meeting to order for discussion of new and unfinished business. The executive committee was asked to meet with the chairman and secretary immediately after adjournment, to plan a program and select a location for spring meeting.

A letter from Mr. John Crist, Chairman of Piedmont Section, was read, asking that the three Southern Sections have a get-together summer outing. A discussion followed and the consensus of opinion was that Asheville or Chattanooga would be the best point to hold such a meeting. There was no vote taken as to the most logical place but the members were requested to attend if this summer outing was scheduled.

Mr. J. W. Ivey, Charlotte, Piedmont Section, asked that the Southeastern Section plan ahead for a full delegation to the Annual Meeting at Greensboro, N. C., to be held sometime in December, 1932. The Chairman asked that all members try to arrange to attend this meeting.

The Secretary was called on for a report.

The minutes of the fall meeting, held October 3rd, 1931, were read and accepted.

The resignation of R. A. Field, Jr., as treasurer was read and accepted. The name of H. H. Field, Eagle & Phenix Mills, was offered and he was unanimously elected as Treasurer.

The Southeastern Section shall include Central and Southern Alabama below latitude 34° 30', north, Rome, Ga., and Gadsden, Ala. West of Augusta, Ga., with mills in Mississippi, Louisiana, Texas, Florida, if they so desire can affiliate with this Southeastern Section. This is the official territory outlined and approved for the Southeastern Section, members of this and other sections may designate the group that they wish to affiliate with, due to the territory that they may travel or prefer.

The petition to the Council was signed by twenty-eight members and members-to-be (whose signed application and checks accompany the petition for formation of Southeastern Section.)

The Sectional Committee appointed is as follows:

George J. Purvis
W. C. Jackson
Tom Taylor
W. F. Christman
C. A. Jones

This group acts as executive committee and a program was outlined and the spring meeting was scheduled for April 30, 7:00 P. M., at School of Textile Engineering, Alabama Polytechnic Institute, Auburn, Ala. There will be a Dixie College League baseball game on the afternoon of April 30th, between Auburn and Georgia Tech, so the members agreed that this would insure a large attendance for the night gathering.

Chairman Fiemster introduced the Auburn Glee Club Quartette, who gave three popular numbers and were voted many thanks for their entertainment offered.

Chairman Fiemster introduced Robert H. Harris, Spalding Knitting Mills, Griffin, Ga., who gave a talk on the "Dyeing of Skein Yarns for Use in Ingrain Hosiery." On completion of the talk—applause.

Dyeing Skein Yarn for Use in Ingrain Hosiery*

By **ROBERT H. HARRIS**
Dyer and Chemist, Spalding Knitting Mills, Griffin, Ga.

THE subject, "Dyeing Skein Yarn for Use in Ingrain Hosiery," cannot be covered thoroughly in this brief discussion, and only a few of the most important points can be touched upon. These will relate mainly to the dyeing of cotton and rayon skeins.

Not long ago I heard a speaker tell his audience that he wanted to stand up where they could see him, speak up so they could hear him, and shut up so they would like him. I promise to keep in mind especially this third point, for I wish to only keep from boring you, but give you a chance to have an open discussion on the subject of skein dyeing.

The requirements for ingrain hosiery yarn may vary slightly from those in other plants, but we must all have our yarn evenly dyed, the shades matched, the proper degree of fastness for the color, and the yarn soft and pliable.

How are we going to determine when a skein or batch of skeins is evenly dyed? Here is the only method we have found entirely satisfactory: Take a skein from each lot, dry it quickly in hot circulating air, and then knit it into a fabric either on a ribber or knitting machine. The slightest variation in shade may be easily detected. The knit sample also enables us to judge shades on brilliant rayons more accurately, for several angles of the rayon strike the eye at once and reduce the glare which is so confusing when judging the shade in the skein.

The fastness requirements depend upon the work for which the yarn is intended. For use in hosiery which is not to be cross-dyed or bleached we use direct cotton colors for light and medium shades, and diazotized and developed or sulphur colors for the heavier shades. For hosiery which is to be cross-dyed or bleached with peroxide we use vat colors only.

The maximum degree of softness and pliability is necessary so that the yarn may knit easily and have a soft

*Presented at Winter Meeting, Southeastern Section.

feel in the finished sock. Several factors enter into this, namely the processing, the softening in the rinse, and the drying of the yarn.

Sulphur colors must be handled with caution, for at high temperatures they have a very harshening effect on the yarn. In reducing some of the sulphurs we have found that Caustic Soda and Sodium Hydrosulphite work very satisfactory and have the added advantage in Monel Metal equipment of eliminating some of the black precipitate on the tub caused by the action of the sulphide on the Monel metal. In stripping direct colors much care must be exercised in order not to harshen and stiffen the yarn. Softening agents can be used in some stripping baths which help to keep the yarn in good condition.

After dyeing, a last rinse in a good softening solution adds much in giving the yarn a soft, lofty feel, and improves the knitting qualities. Sometimes, however, no amount of softening can redeem a yarn which has been stiffened in processing.

In drying the yarn the temperature must not be too high in the drying room, especially for rayons. We have found near the ceiling of our boarding room, where the temperature is between 80 to 100 degrees, an ideal place to hang the yarn, drying it in about twelve hours, and keeping it soft and pliable.

What is the best equipment for dyeing skein yarn? Here we will have many differences of opinion, and each machine or method of dyeing may have its good points. There is one thing, however, that we all want—equipment which turns out the best production for the least cost. Many things enter into this, depending largely upon local conditions. A few of the things to be considered might be: labor cost, consistency of work producer, the percentage of waste caused by the dyeing process, and the liquor ratio.

Various types of machines are in use today which greatly reduce labor costs compared with the old system of dyeing by hand in open tubs. If a plant requires only a very small amount of skein-dyed yarn, then dyeing by hand is probably the most economical method, but with a production which is at all constant, a machine would probably pay for itself in a short time. The more we can eliminate the human element and the greater variations and weaknesses thereof in our dyeing operations, the more consistent will be our results—and the more satisfactory, provided the equipment used is efficient. Modern equipment *is* efficient and gives consistent and satisfactory results.

One of the most recent machines on the market employs an entirely new principle in skein dyeing. Instead of immersing the yarn in the dyebath, this machine pumps the dye-liquor into the top of the skeins which are suspended above the dyebath by perforated pipes. The dye-liquor flows down the length of the skeins into the tub below, thence into the pump again and back into the skeins. The skeins are covered and saturated with the dye-liquor which resembles very much a waterfall. The skeins are turned as often as desired by an automatic turning device. This allows each part of the skein to absorb an equal portion of the dye.

The less agitation given to skeins when being dyed—especially fibers such as silk and rayon—the fewer tangled skeins there will be. This machine keeps the skeins practically stationary for the greater part of the time, and samples can be taken by merely stopping the flow of dye-liquor and lifting a skein from the lot. Waste in tangled skeins is cut to a minimum. In our plant we now get 100 per cent winding on all cotton skeins and as a rule 100 per cent on rayons.

The liquor ratio—or in other words the number of pounds of water in the bath to the number of pounds of yarn—is a factor seldom considered when figuring costs of dyeing. Yet, in proportion as we reduce our liquor ratio we bring down our costs.

Penetration oils are usually recommended in terms of a given number of pounds of oil to one-hundred pounds of material. This seems logical for scouring and detergent compounds, but should not a penetration oil be figured on the volume of the dyebath and on the kind of material to be dyed, and not on the number of pounds of materials? In other words we figure on a one-half of one per cent solution for one of the oils which we use in most of the operations where this oil is used.

When dyeing skeins in the open tub, the liquor ratio usually runs around 60-1. In the machine which we have referred to the liquor ratio is 15-1 or one-fourth as much as the open tub. Penetration oils can be cut in proportion, the dyes in the bath are used more sparingly, and other chemicals and dyeing assistants must be cut down.

When we installed our machine, we were able to cut on oils approximately 75 per cent, on dyestuffs from 20 to 50 per cent, on salt about 60 per cent, and on miscellaneous chemicals such as caustic soda and sodium hydrosulphite used in dyeing vat colors the saving was approximately 50 per cent.

Besides the large saving in the dyeing operation, we have much better dyeing, and the saving in yarn is considerable. A lot of 40 single, unmercerized cotton yarn was worked over after being dyed unsuccessfully in the open tub, and good winding was obtained in spite of the fact that the yarn was badly kinked up in the first dyeing. The flow of the dye-liquor on the machine straightened out all the kinks and dyed the yarn perfectly level.

Discussion

Mr. Noel D. White, Chairman of South Central Section who was present, was asked to lead discussion.

Noel D. White: The great progress and ingenuity shown in skein dyeing and the equipment as outlined by Mr. Harris is truly amazing, and is a far step from the

condition prevalent in the silk skein dyehouse of 15 to 30 years ago. The essential item continues and that is the "Correct Matching of Shades," and the recording of formula carefully. What are the types of dyes used in the various depth shades?

R. H. Harris: For light shades the fast to light and washing directs used are satisfactory for cross-dyeing but not peroxide bleach. While on medium and heavy shades the vat colors were used as they must stand up both cross-dyeing and peroxide bleaching baths.

Noel D. White: Can vat and naphthol dyed cotton yarns be substituted in place of silk resisted yarns in full fashioned hosiery?

R. H. Harris: Our experience is that the vat dyed yarns are more suitable than resisted or immunized yarns as the cross-dyed (direct dyes) can be stripped off on "re-dye lots" and re-dyed satisfactorily, while this cannot be carried out successfully with resisted yarns.

E. A. Feimster: Can you tell how a competing mill might offer a sulphur green dyed yarn against a "developed" green and secure a premium for the sulphur green?

Noel D. White: This is a clear case of a "high-powered" salesmanship.

Chairman Feimster: If there is no further discussion of Mr. Harris' article our next speaker is Mr. T. Edgar White. Our Secretary has him written up as a "Technical Representative," so everybody be prepared to hear a "real expert" now.

"The Preparation of Dyeing of Vats and Naphthols on Piece Goods" was the title of T. Edgar White's talk. Completion of paper—applause.

The Preparation and Dyeing of Vats and Naphthols on Piece Goods*

By **T. EDGAR WHITE**

Technical Representative, Ciba Co., Greenville, S. C.

THIS is a subject which I know to be of major interest to numbers of the members of this section and one in which I, personally, am exceedingly interested.

In the beginning, let me say that the caption of this paper is one that no one person or paper could possibly cover, since it has too many angles for discussion. However, I shall endeavor to take one routine and follow through, branching out to other angles as much as I dare.

First, let me consider our grey goods and their ultimate requirements in regard to fastness; then the equipment which we have at our disposal. In this paper, I shall use broadcloth with vat color requirements.

These goods should be thoroughly desized, this being accomplished by impregnating the goods with malt, extracts, or acids, as it passes through the quenching box on the singe machine. Incidentally, the singe adds or detracts considerably to the appearance of the finished fabric. The impregnated goods are steeped the necessary time, which is determined by the agent used. The decomposed starches are then removed commonly by passing through rope washes, preferably hot and then cold water. Just here, let me say that the more completely this is done the less we have to contend with this element in the kier, as the kier is not intended for desizing purposes. At this stage, we have a choice of two ways to go: either to the kier for boiling, or to the mercerizing range. Personally, I prefer the latter. However, we will leave that reason for future discussion, if anyone is interested in this change in procedure here. The goods should have a very uniform mercerization, plenty of good washes afterward and, from there, go to the kier for boiling. The length of time, steam pressure, the amount of caustic soda, soda ash, etc., is optional; but there is one thing that is positive in regard to this part of the preparation: The washing down and cooling off of the goods in the kier. If this is not handled properly, we will most certainly have stains from the kier which, eventually, show up as resist spots in the dyeing. My idea is to wash with hot water first, gradually cooling to cold, never uncovering the goods in the kier until same are cold. These goods are thus bleached, washed and soured, then washed again. In this process, there are also precautions that must be observed to insure the best possible preparation for dyeing vats and naphthols. It is bad policy to let the goods dry in spots on top of the bins or to pull out loops for observation and leave them on the side of the pile or bin. I do not think it advantageous to let the goods in the chlorine or the sour steep over night. If it becomes necessary to leave the goods in either of these steeps for any unusual length of time, it is well to wet down the top of the bins with a very weak solution of chlorine or acid,

*Presented at Winter Meeting, Southeastern Section.

depending upon which condition the goods are in at the time of the delay, as we would be almost certain to have resist spots should these goods dry out at this stage. It is as important to have uniform white in the bleach as it is to have a uniform dyeing from the machine, especially for light shades. After bleaching the goods, they are dried and made ready for the various types of dyeing machines. Some goods are plaited in boxes or crates; others are rolled onto shells of large dimensions and some are batched on shelves of given yardage for jigs. It is advisable where goods have been dried and remain in the dyehouse for any length of time before dyeing (and especially so if you have undue condensation in the dyehouse) to re-dry the goods just before they go into the dyeing machine, as the condensation drips from the ceiling, causing damp spots in the goods and, needless to say, the goods will not absorb this moisture with any degree of uniformity.

Let us pause here and sum up what should be the proper preparation of piece goods to be dyed with vats and naphthols. We have gotten the best possible singe on both sides; have thoroughly removed the starch and sizing; have maintained an accurate and uniform twaddle and temperature in mercerizing; have given the goods sufficient boil, taken the necessary precaution in cooling after the boil; the bleaching and sour and washing completed without any undue delay; and the goods dried at a uniform temperature.

We are now ready to discuss the dyeing of these goods.

If we have unevenness in the width of our bleached cloth on the jig it is advisable to run same through as it is very necessary to have uniform widths and evenly batched rolls for jig work.

The goods are passed back and forth through the reduced liquor a given number of ends. Our first thought is to maintain evenness from end to end, and batch to batch. In this method, the color is not all applied on the first end, but divided proportionately for the first, second and sometimes, third ends. The amounts to be added to the first and succeeding ends are best determined through practical experience. However, we may sometimes make a dyeing from a bath in the jig which has been exhausted or the shade desired acquired. In this way, the amount of color found in the bath should be the necessary amount to add to the first end plus the regular feed.

Another method is Reduced Padding. This is accomplished by running the goods through the reduced liquor and nip bowls, and subsequently rope soapings and washings. This method is applicable to light shades with a certain degree of fastness requirements. This machine may be run at a high speed—80 to 110 yards per minute. The advantage of this method being low labor cost plus savings in wasted dye liquor at the end of the run, especially when we have small lots of 2 to 4 thousand yards.

Another method is that of Pigment Padding, in which case the goods are passed through vat color paste, pasted with caustic soda and in an unreduced state. These goods are then carried to the jig and reduced with hydrosulphite. This method is very popular, and is recommended especially for heavier vat shades and more especially on heavy goods. The fastness attained is superior to the reduced padding methods. After padding, the goods may be dried and kept for any reasonable length of time, or taken direct to the jig for reduction, directly from the pad.

We also have the Continuous Dyeing Method, which is comparatively new and has numbers of advantages and disadvantages. In this method, the goods are passed through the smallest possible capacity pad box into a heavy nip and directly into re-reducing boxes, consisting of caustic, hydro and, in most cases, salt. A certain amount of color is also added. From here, the goods enter wash boxes, chrome and acid bath, washed, soaped and then washed—this being one operation in a continuous range. By this method, it is possible to run 40 to 60 thousand yards per day. There is one thing connected with continuous machines that cannot be overlooked, that being the volume of the re-reducing liquor. To build, or prepare, and maintain re-reducing boxes with caustic, hydrosulphite, color and salt, costs money and unless we are running shades that require an unusual demand as to fastness to washing and scrubbing, there is an enormous amount of money wasted unnecessarily in this respect.

In regard to the selection of colors for this class of work, each fabric or method has its individual possibilities and limitations and I do not dare suggest any particular color or colors; but we may, by wise choice, select dyestuffs for any of these methods that work satisfactorily as self-shades or in combination.

It is well to bear in mind, in any of the foregoing methods, that we must have colors as nearly as possible of the same dyeing temperatures; the same caustic and hydrosulphite requirements or as nearly so as possible. It is also advantageous to use, in connection with reduced padding and the continuous machine, products which will, to some extent, reduce the surface tension of the reduced vat color liquor.

Discussion

Chairman: We wish to thank Messrs. Harris and White for their very fine papers and will ask Julian T. Chase, of National Aniline and Chemical Company, to lead the discussion on Mr. White's paper.

Mr. Chase: Can goods that are boiled out and bleached in open kier be dyed by the pad and pigment method as satisfactorily as goods processed in closed kiers?

T. Edgar White: The closed kier removes the natural waxes from cotton goods more evenly and this accounts

for the better levelness on the "close kiered" goods. The open kiered goods can be dyed level by taking many precautions.

W. F. Crayton: Does not the re-reduction liquor in the continuous method of vat dyeing with its longer bath increase the fastness properties of vat dyes?

T. E. White: Pease Laboratory has accepted as standards vat dyed shades on both the "short and long bath" dyed shades. My personal view is that from practical tests run there is no increased fastness from the long bath used in continuous dyeing method.

Robert Cowan: What causes the resist spots on vat and naphthol dyed goods?

T. E. White: The specks on chambrays are caused by unreduced dyestuff from the pad box and will show up as specks. The other resist causes are from condensation drops, oxy-cellulose and poor oxidation in the bins on processed goods.

E. A. Feimster: Can the best results be secured on vat dyed goods from very absorbent bleached goods?

T. E. White: Evenly bleached and absorbent goods will give more dyed yards per gallon of prepared dyestuff than a poor absorbent bleach.

E. A. Feimster: How can "crow's feet" be prevented when bleaching in rope form?

E. T. White: Line kier with burlap, this will "ride" side of kiers and keep pressure off of "rope form" while processing and by lightening the pressure on the nip rolls of washers this pressure is reduced. Try to reduce pressure put on goods while in process.

J. W. Ivey: The resist spots are largely traced to aluminum deposits and accumulation from water supply. The use of soap in various finishing processes adds to accumulation of these aluminum salts and soaps.

Robert Cowan: Aluminum soaps and salts accumulate in wool and shoddy dyeing and processing quite frequently.

Chairman: If there is no further discussion on Mr. White's paper we have some further entertainment on the program.

Miss Anna Dozier and her famous amateur dancers of Columbus gave four excellent dancing skits highly enjoyed by all present.

A rising vote of thanks was given the officials, the speakers, the Auburn Glee Club, and Miss Dozier for the excellent program and entertainment provided.

Chairman: Since there is no further business the meeting is adjourned.

Respectfully submitted,

CHARLES B. ORDWAY,
Secretary.

QUARTERLY MEETING, PIEDMONT SECTION

THE Quarterly Meeting of the Piedmont Section was held on January 23, 1932, at the O.Henry Hotel in Greensboro, N. C. The meeting was divided into an afternoon session and an evening session. The afternoon session had an attendance of about 130 and proved to be a very successful meeting. There were 143 present at the evening session, and a great deal of interest was shown in the papers and discussions.

The program for the afternoon session was as follows: Dyeing and Finishing of Hosiery, a paper by W. I. Pickens, Demonstrator for E. I. du Pont de Nemours & Co.; Is pH Control of Water Supply of Textile Mills Necessary? question for discussion, led by C. H. Patrick of the N. C. Finishing Co.; Maintenance of Textile Machinery, a paper by H. H. Iler, Union Bleachery, Greenville, South Carolina; The Relation of Fluidity to Viscosity, question for discussion, lead by A. H. Grimshaw, State College; How Can You Test Finishing Materials Such as Soluble Oil and Tallows to Determine Whether They Will or Will Not Turn Goods Yellow on Storage? question for discussion, led by John Bothamley, Atlanta, Ga.; and What Is the Most Efficient Speed of a Padder for Dyeing Direct Colors? question for discussion, led by William S. Marnock.

The program for the evening session was as follows: Dinner was held at 7:30 P. M. followed by an entertainment arranged by our local committee. A short business session was held at which the following letter from the Greensboro Chamber of Commerce was read:

January 23, 1932

To Officers and Members
American Association of Textile Chemists and Colorists
Piedmont Section, in Convention at
Greensboro, North Carolina.

Gentlemen:

May we extend to you most cordial greetings as guests of Greensboro? It is always a pleasure to have you and we hope you will repeat your sectional visits again and again, assured of always finding a warm and sincere welcome.

We take this opportunity to extend to you and through you to the National Association a most cordial invitation to hold this year's joint meeting of all the sectional groups in Greensboro.

Greensboro entertained one hundred ninety-one conventions in 1931, with a total attendance of 35,718 delegate days. We mentioned this, not by way of boasting, but as tangible evidence that Greensboro has the facilities for successfully handling conventions. It has been noted that as a general proposition the ratio of convention attendance to total membership runs higher in Greensboro than in other cities. This is due, principally to its accessibility by rail, bus, highway, and air, and the fact that delegates throughout this section know by experience that their comfort and entertainment here has always been adequately provided for. You may be sure that the good offices of the Chamber of Commerce and every local agency will be placed at the disposal of the National

Association to the end that the convention will be thoroughly successful in every particular.

May we suggest that appropriate steps be taken by the Piedmont Section to invite the National Association to Greensboro for its next annual meeting?

PAUL C. LINDLEY, *Mayor*
E. C. MCLEAN, *President Chamber of Commerce*
E. L. BROWNHILL, *President Merchants Ass'n.*

The following resolution was made and unanimously carried:

"I move that the Secretary be instructed to forward the letter just read to the National Headquarters with the approval of the members of the Piedmont Section here present and that he convey to Mayor Lindley and the commercial organizations mentioned, expressions of our appreciation of the hospitality shown us at this meeting."

A paper was presented by Miss Elizabeth Weirick, Chief of Textile Laboratory, Sears-Roebuck & Co., Chicago, Illinois, on "Tests and Standards Used in Testing Cotton Fabrics." "The Sanforizing Process," a motion picture by courtesy of Cluett, Peabody & Co., was explained by W. R. Arrington of the Union Bleachery, Greenville, S. C.

The Sectional Committee decided to hold our next meeting in Greensville, South Carolina, on April 23rd. The organization voted unanimously to hold this meeting in two sessions.

The officers and members consider this meeting to be one of the most successful held by our section.

Respectfully submitted,

J. D. SANDRIDGE,
Secretary.

Dyeing and Finishing of Hosiery*

By **W. I. PICKENS**
E. I. du Pont de Nemours & Co.

SOME two weeks ago when I was first informed that I would be expected to give this paper on Hosiery Dyeing, I was turning the subject in my mind trying to decide just what angle or phase of it would be best to discuss. At that time, the thought struck me that since this immediate section manufactures largely rayon and cotton stockings for women, also a medium grade of fancy half hose, that it would be best to discuss some of the problems involved in this type of work. Then I began to ask some of my dyer friends for suggestions as to subjects that they would be interested in hearing discussed. One man whom I asked the question, what would be interesting and helpful to a group of hosiery dyers? replied: "Tell them that hosiery dyeing consists of three-fourths luck, one-fourth bull, and a helluva lot of hard work and worry." This statement was made as a bit of humor, but in thinking over it later, it struck me as being somewhat true, especially the latter part. There is no class of dyeing of which I know, which has as many various fibers to dye as in hosiery, and to make matters worse, they occur in all kinds of combinations, which tend to make it more difficult.

Another friend suggested the old subject of the dyeing of pure thread silk hosiery in the one-bath, as compared to the two-bath method. This is a subject which has been discussed at numerous times before, and I do not believe that the advocates of either system have been able to establish their method as the best, in the opinion of all dyers. Due to this decided difference of opinion, I was hesitant about bringing up this subject. However, my friend was genuinely interested in learning more about the comparative merits of these two systems and I therefore decided to discuss the outstanding points as I see them, hoping that from these comments and the subsequent discussion which will undoubtedly follow, that my silk dyer friends may get some helpful information.

Sometime ago, I would have unhesitatingly recommended the two-bath method, but more recently I have realized some of the advantages of the one-bath method, and feel that with some few exceptions, the one-bath method would be preferred. In discussing this matter, I think it would be well to outline the advantages claimed for each method. The claims of the two-bath method are economy of dyestuffs and more uniformly working formula. The claims of the one-bath method are increased production, less handling, and consequently less seconds and a better finish.

It is true that the two-bath method will probably save on the cost of dyes, but I really believe that this will be more than offset by the time saved on the one-bath method. I am sorry that I have not any definite figures to give on this, but I have never had the opportunity to make any definite comparisons along this line. However, it is my opinion that taking everything into consideration, the difference in the cost per dozen would be so small as to be negligible, and even then would probably be in favor of the one-bath method.

The question of uniformly working formula, of securing check dyeings from run to run, is one which I believe influences a number of dyers to favor the two-bath method. The proper selection of colors will give just as uniform checks from run to run, in the one-bath method

*Presented at Quarterly Meeting, Piedmont Section.

as in the two-bath. I do not believe there are many silk hosiery dyers, if there are any, who do not have to make small shading additions to the majority of their runs, whether they be the one-bath or the two-bath method. These additions are generally very small, and in either case do not materially delay the completion of the dyeing. However, one point must be emphasized, and that is the selection of the proper type of dyes. There are a limited number of colors which perform well in the one-bath method, and it is essential that these types be selected for this work. If, for any reason, these types are not available, then probably the two-bath method would be better. Some dyers claim that as a rule the one-bath method will check somewhat better than the two-bath, due to the fact that when the degumming oil or soap is put in the bath a more or less definite pH is established, which is varied less by changing water conditions than when just the raw water is used as a dye bath.

If we admit that the one-bath formula will check as well as the two-bath, and I really believe they do, then it is certainly true that the one-bath method fulfills the claims made for it, as concerning more production and less handling of the material.

The matter of the finish is one which I am not prepared to discuss further than to say that in most cases a scroop or hand may be given the goods, regardless of the method of dyeing. It is claimed by some dyers that the two-bath method takes some of the life out of the silk, due to removing practically all of the gum in the first bath, and then giving it 45 minutes to one hour in another boiling bath. To overcome this, some dyers have resorted to what I call a combination of both methods, which mean that they partially degum in one bath, and then drop that bath and finish degumming in the dye bath, which has practically the same properties as the one-bath method. In this method, the first bath is not run long enough to make it necessary to resack, and the material is put immediately into the second or dye bath. This system is simply a variation of the one-bath method, and I personally do not believe it has enough advantages, if any, to be chosen in preference to the one-bath method.

As I have previously mentioned, there is made in this section a quantity of ladies' rayon and mercerized cotton hose. There are several outstanding problems encountered by the dye-house man in processing these numbers. I presume one of the most outstanding problems is in the case of rayon when hard water is encountered. The combination of rayon coning oil, soap and hard water is one that has caused a lot of trouble. Some dyers prefer to adopt the two-bath method to remove the oil before dyeing. In this case, it would be best to give the material a good boiling off, starting at a point near the boil, with plenty of good soap or scouring oil. After some 15 or 20 minutes, the machine should be flushed over to prevent the coning oil and soap curds precipitated by the addition of cold water, from settling on the goods. Of course, if the mill has a hot water supply, then this would be used to advantage at this point. When the oil is thus removed, care must still be taken regarding hard water curds, but it has been my experience that these curds do not give near as much trouble when the coning oil has previously been removed.

Some plants find that they do not have to resort to this method, but dye in the one-bath method, and flush the machine over at the end of the dyeing period, rather than drain it. This flushing serves as a rinse, and the goods are removed without further rinsing, as soon as they are cool enough to handle. In some cases, I have found that this method gives trouble, and that it has been necessary to remove the material from the dye bath without rinsing or cooling. In this case, the goods are always sacked, and a smooth stick is used to lift the sacks from the machine.

The addition of trisodium phosphate or soda ash will help in keeping out these hard water curds. There are also on the market certain scouring oils which will emulsify coning oils in hard water without precipitation of curds. Of course, the ideal solution of this problem is soft water.

The question of obtaining a good union between rayon, and mercerized cotton toes and heels might also be raised. There are just two things, I think, to be considered in the solution of this problem: One is the proper selection of dyestuffs. There are some types of colors which will dye very good unions on these two fibers, and others which will dye anything but a union. The other consideration should be the method by which the dyeing is made. On most types of rayon we find that a dyeing started at or near the boil and salted quickly, will give more color on the rayon than when the same color is dyed by the method of starting the dyeing at a lower temperature. On some types of machines it is not practicable to start dyeing at a boil, and on some others, it is. We know of plants securing excellent unions between low luster rayons and mercerized cotton, by preparing the dye bath at the boil, and throwing in the dry material, running at the boil and salting after 15 minutes. In another case, this procedure is followed, with the exception that Glauber salt is used, and the salt is added with the dye before the material is entered.

One of the pet alibis of the dyer has always been that there is a variation in the rayon yarn. I am confident that there is not the occasion to blame the yarn as much now as in former days, although it is still true that different rayons have different dye indices and should not be mixed indiscriminately in various dye lots.

Another type of hose which gives trouble more or less regularly is the ladies' plain mercerized cotton hose. Tiger stripes have been and still are periodical nightmares. We believe that in some cases when this occurs it can be

slightly reduced and made to appear less pronounced by care in the dye-house, but rarely, if ever, entirely eliminated. If tiger stripes are caused by unevenly applied softening oils in the yarn, it may be improved by a good detergent and by boiling. Two tones in the same dye-bath occur more frequently on this type of hose than any other. This problem is allied with that of tiger stripes, in that in some cases there is little or nothing that can be done about it in the dye-house. However, this trouble is frequently caused in the dye-house and can be corrected there. Uneven heating in the dye machine is the first thing to be checked up on. Then again, the selection of proper type dyestuffs is important. Colors which level well and exhaust well without salt or with a minimum quantity of salt should be chosen. I believe the ideal way to dye this type of ladies' plain mercerized hose would be as follows:

1. Use pocket type machines.
2. Use carefully selected dyestuffs.
3. Use quality grade scouring and penetrating oil.
4. Start at low temperature, raise to the boil and boil vigorously during the entire dyeing period.
5. Do not use salt.

Of course, there are plants which do not have the proper type machines and where other local conditions make it necesasry to work out special procedures to dye this material.

I believe that the mills in this section are having less trouble now on their fancy half hose than ever before. This is probably due to the fact that everyone has become more familiar with the various synthetic and natural fibers and know more about processing them.

One of the most common problems on those styles which cannot be boiled on account of sulphur dyed yarns or acetate yarns, has been spotted heels and toes occurring in very light shades. It has been my experience that this can be overcome by preparing the dye bath with the proper asssitants, at approximately 170 degrees Fahrenheit and entering the dry material without previous wetting out. Of course, this method would not be practical in some type of dye machines.

One of the fibers which has come into use more recently on fancy half hose is spun resisted silk. I have found that it is necessary to guard against any degree of alkalinity in the dye bath, in order to work this yarn without staining. Even a small amount of alkali in the dye bath will frequently cause dyed resisted silk to change its tone, and will also cause natural or white to become badly stained.

To attempt to discuss in detail, all the various fibers and problems which enter into fancy half hose would require considerably more time than we have allotted to us. Therefore, I shall not attempt to discuss these details, but in thinking over fancy half hose dyeing problems in a general way, I always arrive back at one point; and not only in half hose, but in practically all other dyeing, we sooner or later find ourselves returning to this same point. That is, the selection of the proper colors for the work at hand. There are any number of dyes which have different properties of fastness and exhaust. There are union dyeing colors, and those that dye one fiber and leave another clear. There are colors which will dye from the peroxide bleach bath, and colors which will work well in an alkaline degumming bath. There are also colors which will not do these things. To my mind, the selection of the proper color is one of the principal solutions of all our problems, and closely allied to this is the selection of proper assistants to be used in dyeing. Then, of course, the procedure or method is also important, but to my mind, it is secondary to the selection of the proper type dyestuffs.

In summing up my remarks, let me say this: A successful dyer and finisher of hosiery carefully selects his dyes and chemical assistants to fit the need at hand, then carefully selects the procedure to be followed in the applica good hard common sense.

ANNUAL MEETING, SOUTH CENTRAL SECTION

The Annual Meeting of the South Central Section of the A. A. T. C. C. was held at the Read House, Chattanooga, Tennessee, February 13, 1932.

During the serving of the banquet a most enjoyabl entertainment and instructive talk was given by Dr. T B. Cowan, after which the meeting was called to orde by the Chairman. The minutes of the previous meetin were read and adopted. The Treasurer's report wa read and approved.

Mr. Robert Cowan of the Quaker City Chemical Com pany read a paper on "Troubles Caused by Mildew i Dyeing and Finishing." The subject was very ably han dled and caused quite a bit of discussion.

A letter from the Piedmont Section concerning a join meeting was read and left for discussion at the nex meeting. The annual election of officers was held, resulting in the unanimous election of the following:

Noel D. White, Chairman, Dyer, Davenport Hosiery Mills, Chattanooga, Tennessee.

Nestor Groteluеschen, Vice-Chairman, Chemist, Rea Silk Hosiery Mills, Dalton, Georgia.

Andrew Kelly, Secretary, Chemist, Burkart-Schier Chemical Company, Chattanooga, Tennessee.

Harold Schroden, Treasurer, Chemist, Dixie Mercerizing Company, Chattanooga, Tennessee.

There being no further business, the meeting was adjourned.

Respectfully submitted,

J. D. Mosheim,
Secretary

Proceedings of the American Association of Textile Chemists and Colorists

Maintenance of Textile Machinery*

By **H. H. ILER**
Union Bleachery, Greenville, S. C.

WHEN we contemplate purchase of machinery, we give much careful thought to: Suitability for the operation we have in mind; Initial Cost; Productive Capacity; Power Required to Drive, and Amount of Floor Space Required. Of course all of these are of prime importance, but there are other considerations which should be taken into account, as they affect the value of the investment to an extent that may mean the difference betwen profit and loss during times like the present when everything we do must be done on very slender margins, if indeed there are any margins at all. The additional considerations are Sturdiness; Provisions for proper and adequate lubrication; Accessibility of component parts for repair or replacement; Kind and quality of materials entering into the construction; Simplicity of design, and Ease of operation and control; all of which are going to have some bearing on maintenance costs which must be figured into cost of production.

In view of the fact that inspection is essentially a maintenance function, it would appear that maintenance should start with installation supervision, in order that maintenance personnel may acquire first hand information concerning details of design, construction, and operation, upon which to shape future plans for the prevention of costly operation outages in so far as may be practicable, and in order to have a check against errors of installation and assembly.

Installation will be a factor in the successful operation and longevity of machinery, and as installation starts with foundations, and their supporting media, it should be seen to, that foundations are proportioned to carry their dead weight loads with a generous factor of safety, and at the same time be massive enough to absorb vibration—that insiduous and persistent foe of successful maintenance. However generously proportioned and expensive they may be, they will not properly serve if they do not have commensurately proper bearing upon their own supporting media. In earth their footings must be spread over areas large enough to assure reasonably low per square foot pressures in accordance with established practice, but in soils which are not characteristic, loading tests should be resorted to in order that load bearing qualities be accurately determined instead of guessed at. Poor and insufficient foundations contribute their part to maintenance costs by permitting injurious swaying, rocking, and vibration.

It would be uneconomical to provide foundations in which we have substantial investment of money, did we not take full advantage of their steading ability by providing secure anchorage of our machines to them. Details of such anchorage will vary with installations, and are hardly necessary to describe here. Suffice it to say that top notch operative efficiency is hardly possible when machines shimmy around on foundations like the hula-hula dancer of Hawaiian travel advertisement fame.

After installation, machinery should go through a period of "limbering up" before it is started upon regular productive schedule. This procedure is just as important and desirable with our machinery as it has come to be regarded with preparing our motor vehicles for road use. If we very carefully put a new car through some hundreds of miles before we demand of it that it perform in accordance with it's maker's claim, then why shouldn't we use similar precaution with productive machinery costing in many cases much more than the most expensive automobiles? This running-in, or limbering up, will also be properly under supervision of maintenance personnel because we have here another detail which will have bearing on maintenance costs, and machine life.

Lubrication will be a very important factor in the formulation of any maintenance plan, as it is essential, even vital, to proper functioning of any mechanism having moving parts. Too much importance cannot be attached to the matter of working out thoroughly effective plans which will unquestionably assure proper lubrication of all parts where friction will occur. Selection of lubricants; methods for their application; supervision of lubricant storage and issue; and consultative supervision of lubricant application schedules, would seem to also be functions of the maintenance agency in the plant.

Assembly in some special cases is best taken care of by fitters from the manufacturer's shop because of their training on, and consequent familiarity with, specialized machinery. In such cases there is good reason for maintenance personnel to maintain constant contact as assembly progresses, in order that they may be more or less familiar with unusual features, and peculiarities, when such installations come under their care. Their possession of knowledge concerning local conditions may also make them of valuable assistance to the manufacturer's fitter in his task of carrying to completion in reasonable time, an installation which will function as

*Presented at Quarterly Meeting, Piedmont Section.

its designers intended. Many machinery installations may, however, be more economically made by the plant's own forces, under maintenance supervision and direction, as for instance, where similar machinery is already in operation on the premises, and where simplicity makes the services of a specialist unnecessary. Maintenance personnel should in all cases see that fitting is carefully done in accordance with accepted practice, and that bolts, nuts, screws, set screws, etc., are sufficiently tightened as the work progresses, as looseness of these important members will result in interruptions of operation and also bear on maintenance costs. It is also essential that no misalignment of parts, of maladjustment of same, is permitted to remain in the assembled whole, and it is also essential that the whole assembly be leveled for permanence. Life expectancy of gears, chains, bearings, and journals, is materially reduced by misalignment, and by maladjustment, and costly friction loads are imposed upon the power supply as well. Incidentally the quality of product can be, and often is, adversely affected, and the quantity of same is often materially reduced by resultant outages for correction and repair. Here again we note a potential possible contributor to maintenance costs.

Maintenance methods and costs will also be affected by the kind and quality of material, and the class of workmanship, the machinery manufacturer puts into his product. If his engineers err in selection and proportioning of materials, or his workmen observe improper care in the fabrication and fitting of parts, it naturally follows that the penalty for these will be paid by the purchaser in increased maintenance, and faulty operation, as well as leading to unpleasant controversy, and unsatisfactory business relations. It is perhaps not out of place to say here that few American machinery manufacturers do not welcome constructive criticism from the field and honestly try to profit thereby. My statement would not be complete however did I fail to say that among these few are some who, in their estimation, reached engineering perfection long ago, and they are not therefore open to suggestions looking to possible improvement of their product.

Maintenance is usually made a function of the mechanical department, and properly so because of the experience and training of mechanical personnel, and because of the mechanically corrective facilities available to them, but it would not seem wise to take away from departmental authority all responsibility for condition of machinery in such department. The individual responsible for production is not a mechanical engineer but he should have sufficient mechanical knowledge of the machinery in his charge to enable him to decide whether repairs should be made promptly following his acquisition of information that they are needed, or postpone same to a more convenient time when machines are out of schedule production. He should also be informed on the capacities and limitations of his machinery, and know something of lubrication theory and practice.

Maintenance of machinery will be much more effective if some plan of machinery inspection is worked out and faithfully followed. In plants large enough to provide full time work for a machinery inspector, it is desirable to have someone designated who has a good background of mechanical training, and wide experience with the types of machinery he is to inspect, so scheduling his work that inspections will be repeated at sufficiently close intervals to minimize development of serious faults. This inspector should supply the heads of departments with a copy of his findings and leave it to them to requisition and authorize corrective measures. Plant Superintendent's office should also have a copy which would be held as a check against the department head's promptness in getting his machinery back into condition through the aid of the maintenance agency. These records, showing as they do, how much corrective attention they require, will serve as guides in the future selection of other machines when additional equipment is made necessary by plant growth. Maintenance personnel will report in to Superintendent's office such requisitions as they may have received from departments as a result of the inspector's work in those departments, after requisitioned work is completed, and these are checked off of the copy of inspector's report being held in file there.

If the plant is not large enough to use the plan which has been briefly outlined, this work may be taken care of by each department providing itself with an employee who is mechanically inclined, and who is not averse to doing all sorts of odd jobs such as oiling shaft bearings, clutches, loose pulleys, cleaning and dressing belts, looking for and tightening loose bolts, nuts, screws, etc. This man would be inspector-oiler-fixer, and he should keep his overseer fully advised of findings and activities in order that mechanical department may be called in when their services are judged by him to be needed. In one instance we have been experimenting with the plan of assigning one mechanic continuously to a group of machinery with just about the duties above mentioned, and thus far it shows promise. This man's presence in that department relieves the overseer from the necessity of frequently requisitioning the mechanical department for mechanics to take care of minor repairs and in this way many costly delays in operation have been avoided, and the overseer's mind is left freer to concentrate on productive considerations. It is not good however to permit machine operators to shift details of machine lubrication to the inspector-oiler-fixer as they are usually many places on machines which require frequent attention throughout the operative period and obviously this man cannot get around to all those frequently enough and at the same time take care of his assigned duties properly. The machine operator should be required to per-

sonally oil all bearings of his machine before starting into each period of operation unless they happen to be of the frictionless, or self-oiling type. The latter will require attention at intervals as experience has shown to be advisable. The operator should also note any unusual noises in his machine when starting up, and should be on the look-out for unusual behavior, reporting same promptly to his superior or to the fixer. Much repair work has been made necessary, with resultant increased maintenance costs, and many costly outages have been caused, by failure of operative to attend to these details.

Finally, just a word to those in charge of productive departments. Do you co-operate to the extent of your ability, with those who are trying to keep your machinery in the pink of operating condition, by seeing to it that oiling is done before starting up? That oiling and greasing devices are properly kept charged? That your machinery is clean? That parts are not permitted to get loose enough to cause damage and delay? That operatives are not permitted to use sledge hammer and strong arm methods of handling the machinery? That bearings are oiled before they fail and not afterwards? And do you frown upon the tendencies of your assistants to pass the buck of responsibility to the maintenance department when someone's shortcoming in your own department has made some work of the former's futile? If you are a real Overseer, your attention will not have to be directed to these things. If your mind does not take stock of such considerations, then "back to the tall timber," brother, you are a "square peg in a round hole," and modern industry has no place for the "likes of you."

The Textile Testing Laboratory*

By **ELIZABETH S. WEIRICK**
Sears, Roebuck & Co.

SINCE the textile industry has put so many expert chemists and physicists in the field for the purpose of improving products and methods of production many innovations have resulted:

Natural fibers of better quality have been produced.

The manufacture of the artificial fiber, rayon, has developed into an enormous industry.

More clever machines for creating interesting fabrics, for utilizing all grades of fibers, for reclaiming waste, and for shortening manufacturing processes have been put into the mills.

Better and cheaper methods for bleaching, dyeing and finishing have been devised.

A huge dye industry has been successfully developed in this country.

Such combined factors have resulted in giving us the enormous variety of rich, colorful fabrics now displayed in our shops and in bringing them within the reach of the slender pocketbook.

But while scientific cleverness is producing beautiful and substantial fabrics it is also producing most remarkable imitations, is creating good-looking fabrics from poor products, is combining, treating and manipulating fibers in such ways that it is often impossible even for an expert to identify them by mere sight or feel.

These present clever manufacturing processes together with the often roundabout methods of marketing fabrics and ready-to-wear clothing, make it difficult for the merchant retailer to know the true character and value of the goods he is to buy and sell, although it is exceedingly important to him that he know. Business competition compels him to be familiar with the probable amount of satisfaction his goods will give to customers. He needs goods at all prices, cheap as well as the best, for there are all kinds of people and pocketbooks, but he demands to know the exact character and worth of the various qualities in which he deals. He finds that the only way of making certain that he is getting the best value for his money when he buys, and the only way to know merchandise accurately is by having it analyzed or tested in his laboratory. Therefore before his buyers place their orders with the manufacturers they consult the laboratory to determine the character and value of submitted samples; and when the goods arrive, it is checked in the laboratory to see whether it tallies with the previously submitted samples.

In response to your very kind invitation to Sears, Roebuck & Co. I have come to tell you something about that part of the work of the testing laboratories which relates to textiles, since that is the field in which you are engaged.

Laboratory Organization

Sears, Roebuck & Co. was among the first, if not the very first, retail organization to establish well-equipped

*Presented at Quarterly Meeting, Piedmont Section.

testing laboratories for the purpose of controlling the quality of its merchandise. They were organized over twenty years ago and now include a Textile Division, a General Chemical Division, an Electrical and Mechanical-Engineering Division. They maintain a staff of well-trained chemists, physicists, engineers, and home economists.

Through the existence of our laboratories, an excellent science reference library has accumulated. Two librarians, both trained chemists, and an assistant are kept busy abstracting scientific articles, compiling bibliographies, and obtaining whatever published information is required. They keep up to date the files of Government pamphlets, specifications, scientific magazines and books. The laboratory also uses constantly the John Crerar Reference Library in Chicago, one of the largest and finest scientific reference libraries in the world.

Laboratory Service

The testing laboratories are at the service of any member of the organization who is seeking accurate scientific information regarding merchandise. Those who depend upon laboratory service most, perhaps, are our professional buyers, who are constantly watching and studying market sources. We, the laboratory staff, work with them when they are choosing their merchandise and again when the goods is finally delivered, when they are considering the introduction of new products, when their merchandise is being described for advertising or catalog purposes, and when they are puzzled by customers' complaints. Buyers realize that it is not well to depend entirely upon claims when ordering goods, and that price is not an accurate basis for determining quality, for frequently he finds he can obtain a better product at a lower price.

When choosing an item of merchandise, such as cotton flannels or percales, an analytical comparison is made of samples from different manufacturing sources and a summary of similarities and differences tabulated. The buyer then weighs the facts of quality and price and chooses the one most satisfactory for his purpose.

When considering an entirely new product, such as toweling made of pita fiber and cotton—some product he has never handled before—the buyer asks these questions of the laboratory:

Is it a practical product?
What is the extent of its usefulness?
Are the claims made for it by the manufacturer accurate?
Will it give satisfaction to the consumer or is it likely to cause us grief?

These questions are answered by both practical and scientific tests and a study of available published information and research that bears upon them. The final opinion may be that the product is quite satisfactory and desirable; or that it is satisfactory in most respects but would be more desirable if certain changes were made, whereupon suggestions for changes are given to the manufacturer, who frequently benefits from the result of the laboratory study and analysis. Again the product may be found to be quite impractical and undesirable—such as would cause more grief than profit, in which case it is recommended that it go into the discard, that is, not be sold.

When merchandise is advertised or sold through the catalog, the printed description of it must be the true description. Every effort is made to state the actual facts as to composition, color fastness, shrinkage, quality, etc., based on actual laboratory tests. All catalog copy is read and checked by the laboratory staff to make sure not only that the descriptions are accurate but that the rulings of the Federal Trade Commission as they affect mercantile advertising are upheld—no small task.

When merchandise is returned by customers, the laboratory is called upon to determine whether the merchandise is at fault or whether the trouble is due to its misuse or abuse through the ignorance or carelessness of the customer. If the fault is in the mercrandise, immediate steps are taken to correct the trouble. To obviate returns because of abuse, the laboratory frequently assists in preparing leaflets suggesting to the customer the correct care of merchandise. Such educational efforts are repaid by fewer returns and greater satisfaction.

The Testing of Textiles

The testing of textiles involves such a variety of microscopical, chemical, and physical tests that I am not attempting to cover the field. The standard tests adopted by the American Society for Testing Materials, the American Association of Textile Chemists and Colorists, and the Bureau of Standards are used whenever adaptable to the handling of commercial products. Many problems, in textile chemical analysis especially, are not yet satisfactorily solved, such as the quanitative determination of wool, silk, rayon and cotton in the presence of tussah silk when all are mixed in the same fabric.

Tests like your standard fastness tests for washing and perspiration require so much time that they are scarcely feasible in a laboratory which has to handle hundreds of samples quickly. Your equipment might be improved to speed up the process.

Tests of cotton fabrics include the determination of:

Weight, with and without sizing.
Percentage and identification of sizings.
Thread count.
Size of yarns.
Twist and evenness of yarns.
Length and color of staple.
Tensile strength.
Tearing strength.
Bursting strength.
Fastness of color to washing, light, and perspiration.

Shrinkage.
Wearing quality.
Absorbent quality.
Waterproof quality.
Permeability to air.
Smoothness or coefficient of friction.

I shall discuss only a few of these.

Weight

We determine weight by stamping out sections, usually 4 square inches, with a steel die accurate to .01 of an inch. Enough sections are taken to obtain a representative sample. The samples are dried at 105°C. for one hour, transferred to weighing bottles and weighed when cool on an analytical balance. The weight is expressed in grams to the third decimal place. The conditioned weight is calculated, allowing 6½% moisture regain in accordance with the American Society for Testing Materials Tentative Standard, 1931.

For rapid commercial work when extreme accuracy is not essential, the air-dry weights are determined. The sections are weighed after they have been allowed to stand from three quarters to one hour exposed to room atmosphere. The weight of cotton fabrics is usually expressed in yards per pound on the basis of actual width and 36-inch width, and reported to the second decimal place. The weight of heavy fabrics, those weighing over 8 ounces per yard, is reported in ounces per yard to one decimal place, or it can be calculated on any desired width. Slide rules and factor tables permit rapid calculation.

Sizing

We frequently want to know how a fabric will appear to a customer after laundering. In such cases the soap soluble dressing is determined.

A weighed bone-dry sample is boiled in 1% neutral soap solution for five minutes, rinsed in distilled water and the solution run through a wire gauze. The process is repeated and the sample finally rinsed thoroughly, dried at 100 to 105°C. for one hour, then weighed. The percentage loss is calculated on a conditioned basis.

To determine the total sizing present, we use the method recommended in the U. S. Government Master Specification No. 345a, a combination of ether extraction and treatments with sodium carbonate and hydrochloric acid.

Thread Count

We use three different methods for counting threads. Ordinarily the Lowinson Thread Counter is used on a glass stand with reflecting mirror beneath. In the case of close, fine fabrics, such as some sateens, a microscope is resorted to or a section is measured off very accurately on a small sample and raveled to the points which mark an inch. The inch of threads is pulled out with forceps and counted.

Unless otherwise specified, an inch of threads is counted and three counts taken, both warpwise and fillingwise, in different parts of the cloth by each of two persons, care being exercised to avoid areas near the selvedge. If their results do not check, more counts are taken.

Tensile Strength Test

We determine the tensile strength of woven fabrics according to the standard method of the American Society for Testing Materials. A Universal motor-driven Scott Machine of 300-pounds capacity is employed and the grab method is ordinarily used for most cotton fabrics.

Tearing Strength Test

We have experimented with several methods for determining tearing strength using the Elmendorf Tearing Tester for light weight fabrics—a pendulum type machine—and the Scott Tensile Strength Machine. Now we use the Preferred Method proposed in the Tentative Revision of the American Society for Testing Materials Standard, 1931.

Color Fastness

The term "fast color" we apply only to those cotton fabrics that are fast to both washing and light or to water and light depending upon whether the material is dress goods or such as awning stripes.

Fastness of Cotton Fabric to Washing

The term "fast to washing" is perfectly clear but there is some ambiguity in the term "washable". I have heard many women say that to them "washable" implies that the fabric will retain its original color and finish and that it will not shrink On the other hand, I have heard some retail men argue that it merely means that the fabric will retain its finish but not necessarily its color. We believe that to the average consumer the term "washable" implies that the material will retain its color as well as its finish.

Colored cotton fabrics—dress fabrics, cretonnes, work clothing, and suitings—that we guarantee, must pass Test 2 for fastness to washing, that is, they must pass the test of washing in laundry soap in the Launder-Ometer as recommended by your Association.

For a long time we required that cotton dress fabrics containing 50% or more of white should also pass Test 1, the test with laundry soap and bleach; but we have eliminated this requirement, believing that housewives do not wash their colored garments with washing powders containing bleach, at least it is contrary to all good commercial and home laundry practice and teaching. However, colored sheeting and towels are required to pass the bleach test.

We rate tested samples:

"Fast" if the colors shows no perceptible change in shade and if the white cloth to which the sample is sewed is not stained.

"Practically Fast" if there is a very slight change

in shade or if the white cloth is very slightly stained or both. The change, however, must be so slight as not to affect the general appearance of the fabric or any other fabric with which it might be combined.

"Not fast" if the colors show distinct fading or bleaching or both. Colors rated as "fast" or "practically fast" are passed as satisfactory. The dark prints with developed backgrounds cause the most difficulty.

Fastness to Light

We use the Fade-Ometer for determining the fastness of colors to light. A fan above and a pan of water beneath the carbon arc control somewhat the temperature and humidity. The samples are exposed to the light for 40 hours, and any changes in color noted at the end of 24 and 40 hours. If no change takes place at the end of 40 hours, a color is rated "fast." If very slight fading takes place but not sufficient to affect the general appearance of the fabric, the color is rated "practically fast". If marked fading occurs the color is "not fast".

Many dyes show fading between the 24 and 40-hour period. When we first began to use the Fade-Ometer about thirteen years ago, we exposed duplicate samples of dyed materials both to the Fade-Ometer and to the sun test in California and Texas in order to obtain a comparison of the effect of the two sources of light on the same dyes. The Bureau of Standards has since done extensive research on this point. We have also made comparisons of the effect of Corex D glass globe as compared to the old, ordinary type but have noted no difference in the effect on colors tested.

The line between "fast", "practically fast", and "not fast" is a point for the human eye and for personal opinion to determine. To be sure, there are instruments such as the Colorscope which can be used for measuring the change of solid colors but as yet the method cannot be applied successfully to prints. The difficulty of rating frequently leads to disagreements between manufacturers and laboratory.

We are now compiling a card-file in which is placed a sample of every cotton fabric that stands all required tests. The samples are arranged according to predominating color and give the tests passed, price, and name of finisher. This gives us an idea of the variety of shades for each color that can be satisfactorily obtained and the extent of such colors available from the different sources. This may help us to find out quickly whether colors are available to replace others that prove to be unsatisfactory.

I am under the impression that the designer creates his designs and chooses his color combinations according to his fancy or the dictate of fashion; and that it is then up to the dyer to reproduce the design in the same colors. The dyer may know when he attempts the job that he can duplicate say four colors out of the five colors required, with dyes which will be fast, but that he has no dye that will give satisfactory results for the fifth. This puts him at a disadvantage.

Would it not help the dyers if they would get together and develop a color-chart representing the available colors and shades which they *know* by experience to be fast to washing and light, fast to bleach, etc.; and then let the designers select their color combinations from these?

Shrinkage

After trying a variety of methods for determining shrinkage we adopted a general laundry procedure. An accurately measured section, usually 10x10 inches, is marked off on a sample and given the same treatment—solutions and temperatures—in the Launder-Ometer as colored fabrics when tested for fastness to washing with laundry soap. The test is repeated.

The tentative method proposed by the Sub-Committee of your Association on shrinkage of textiles has just appeared in the January issue of your Journal. This method varies slightly in the numbers of rinses, temperature, and strength of the acetic acid rinse from the washing test. We shall try your recommended method, but do not believe the results will vary much.

Made-up garments, such as work pants and shirts, are sent to a commercial laundry or tested in a washing machine. The garments are measured and also a section is accurately marked upon some portion. After the first laundering they are returned for measuring. This procedure is repeated about eight times or until shrinkage ceases.

It has not been feasible to adopt a minimum shrinkage requirement for the various fabrics because of the rapid changes taking place in the preshrinking methods used by the mills. However, the claim "100% shrinkproof" is applied only to fabrics or garments that show absolutely no shrinkage; "Preshrunk" only to those which have been preshrunk sufficiently to cause no serious change in the size of a garment. The change in size should not exceed one-half the difference between consecutive garment sizes.

Wearing Quality

We determine by the Wear-Ometer, a machine developed through a period of years. Samples are placed under controlled tension and pressure and abraided warpwise and fillingwise against an oscillating semi-cylinder covered with a standard canvas, changes of which must be made and noted at stated intervals. We have also used a fine-meshed special steel screen over a coarser one. A vacuum removes lint and reduces temperature caused by the friction, while a counter records the number of rubs until the break comes. Samples are sometimes given a specified number of rubs and compared as to appearance. We do not believe that determining the tensile strength of the abraided test sections is a feasible method of measuring wear. The wearing test is far

from solved. We are interested in the various machines used in other laboratories, and hope that the Textile Research Institute will evolve a satisfactory standard.

Absorbent Quality

Absorbent quality is important in the case of cotton fabrics such as towelings and diaper cloth. It is determined before and after laundering. Duplicate test sections 8 inches long and exactly 1 inch wide are prepared warpwise and fillingwise of the cloth. All lengthwise yarns must run parallel with the edge of the section. Water-soluble eosin is applied very sparingly and evenly to the face of each section to serve as indicator. Each section is pinned over a horizontal rod supported at a convenient level above a beaker of water so that the end of the cloth strip comes just above and perfectly level with the surface of the water. A steel rule is clamped or held parallel with the vertical edge of the strip. When all is in readiness the strip is lowered so that the end just touches the water and a stopwatch started. The height to which the water rises by capillary attraction in 1 minute, 5 minutes, and 10 minutes is recorded.

From a summary of a large of laboratory tests we have devised an arbitrary rating:

If at the end of 10 minutes the water rises 5 to 6 inches the rating is excellent.
4 to 5 inches, very good.
3 to 4 inches, good.
2 to 3 inches, fair.
1 to 2 inches, poor.
0 to 1 inch, very poor.

Now and then a cloth will show unusual absorbency and absorb beyond the six inches.

In order to obtain some measurement of the absorptive power of a fabric which has been treated for water resistance, such as denims, twills, silks, cap fabrics, etc., as compared to that of the same fabrics untreated, we devised the following method:

A wooden frame 8 inches square is covered with the material to be tested and is supported by means of a clamp and ring-stand 10 inches above the cone of a humidifier which emits a very fine mist at the average rate of a pint of water every 50 minutes. The framed fabric is subjected to this mist for a given number of minutes, is quickly removed and immediately the edge of a blotter is gently and briskly moved over the fabric from side to side to absorb droplets of moisture standing on the surface. A four-square inch sample is then cut from the center of the fabric with a steel dye and immediately weighed. This sample is dried and the percentage of absorbed water calculated on the basis of the dry weight. Different samples may be tested for 1, 2, 3, 5, or 10 minutes, depending upon how rapidly the fabric absorbs moisture. In this manner, the time required for penetration, the percentage of water absorbed, and the time for saturation may be determined. The results give an approximate ratio of water absorption before and after treatment.

Water-Resistant Quality

Fabrics specially treated to make them water-resistant, such as canvases and drills for tents and tarpaulins, are subjected to the "Modified Spray" and "Modified Funnel" tests as developed by F. P. Veitch and P. J. Jarrell at the Leather and Paper Laboratory of the Bureau of Chemistry, U.S. Department of Agriculture, and reported in the Journal of Industrial and Engineering Chemistry, Volume 12, 1920.

Spray Test. In the spray or rain test, water passing through a specially constructed spray head forms into drops, falls at the controlled rate of 1000 cc per minute from a height of 6 feet onto the sample, held in a frame at a 45-degree angle, for a period of 24 hours. I will not attempt to give all the details of this test. We have added to the method a means of obtaining a permanent record of the water that penetrates the fabric: Beneath the fabric but not touching it we place a blotter very lightly treated with dry, water-soluble eosin. The blotter is changed at stated intervals. Thus any mist, spray or leak is recorded on this.

To be called "waterproof", canvases and drills should rate 10 in this test, that is, the underneath surface should remain dry during the 24-hour period. Light weight fabrics which are merely water repellant are given a spray of 500 or 250 cc per minute for shorter periods.

Funnel Test. The modified funnel test indicates the protection afforded by the fabric when it is in contact with a hard surface or when water accumulates in a pocket and is allowed to stand.

Tent canvases and tarpaulin should rate from 8 to 10 in this test. We have recently completed tests on a lot of light, medium, and heavy canvases to be used for tents and tarpaulins of our own make. These rated high 9 and 10 in the funnel test. About 7-ounce drills and 4½ ounce sheetings will rate around 3 and 4 although these same fabrics will rate from 9 to 10 in the spray test.

Purchasing Standards

Our buyers do not have a set of hard and fast specifications for the manufacture of fabrics. They study and compare products offered in the market and adopt a personal buying standard which can be rapidly modified according to the consumer's demand, business competition, or improvements in the manufactured product. The buyers do issue definite specifications for the size of garments and trimmings to manufacturers.

Our numerous retail stores must be permitted some leeway in specifying the grade of merchandise they re-

quire based on a knowledge of the demand, the sales, and the competition in their respective localities.

The number of grades of a fabric bought varies. This year the price-range is more limited because people are not buying the more expensive grades.

There are certain fabrics for which the buyers maintain a minimum standard; for example, percales and bleached goods such as nainsooks, longcloths, dimities are never considered with grey counts below the standard 64/60. They never use a sub count and advertise it as a regular standard grade.

The following examples illustrate the purchase of goods on a quality basis:

Sheetings from practically all mill sources were analyzed and grouped into classes. Those of a given class, for example 64/64 count, or 68/72 count, were compared in all points of construction—eveness of yarns, finish, cleanness and color of cotton—and the best were selected for consideration.

To find a denim suitable for a special work garment, samples of the 2.20 class from 13 mills were compared for evenness and fastness of color, and shrinkage, as well as construction. Five or six were found to be superior to the others in a number of points, and the best one of these was chosen. Material from these sources was made up into garments and laundered eight or more times to note differences in color and shrinkage. In this case the buyer was willing to pay ¼ to ¾ per yard more than for the others in order to give the consumer better satisfaction.

The manufacturer who produces the best product will get the preference providing the price is in line with competition and the consumer's demand. Quality cannot be the only consideration. The service given by a mill in making prompt deliveries is very important. The best product will be of no value if deliveries fail to meet sale requirements. Then, too, merchandise must have style and attractiveness.

To Sum Up the Value of the Testing Laboratory

It stimulates the production of better products; eliminates worthless products.

Protects merchant and consumer from disrepresented merchandise.

Cuts down returns by accurate descriptions of goods and through the advice to customers on the correct care of goods.

Helps buyers to a more intelligent knowledge of their goods.

Helps to maintain uniform qualities of merchandise and therefore creates confidence in the minds of the consumers and thus leads to a more stable and better business.

JANUARY MEETING, NEW YORK SECTION

(Continued from page (100) 130, Feb. 15th issue)

Mr. Kurash: I want to say something that I left out when I made my remarks before.

There is one difficulty that I have experienced quite frequently recently. I don't know who is responsible for it, whether it is the dyer, or the silk man who holds the merchandise for any length of time, or who it is. But in the material I have been using lately I find there are creases that will not come out even under the strongest and most severe pressure of pressing. I haven't analyzed yet what that is due to. I have a vague idea that it is due to goods being folded in a certain way and laying that way for a long period of time. At any rate, those creases remain in the goods and under no pressure will they come out. I don't know but what when the goods are in a wet stage something happens to them that puts that crease in, which will not come out no matter what we do.

I wonder if there is anybody here who can answer that question.

Chairman Gaede: I might say to Mr. Kurash that those creases might be attributed to both of those causes he has mentioned. There are certain conditions under which a piece of goods might be creased in the operation and the crease would remain there. Nowadays, of course, with the careful examining we have that shouldn't happen. But some goods are held on the shelves longer than they should be and it stands to reason that when goods are piled up, one piece on top of another, the bottom pieces will be under very great pressure. Naturally those creases that form in there are not going to come out so easily.

Mr. Kurash: That is the question I wanted to ask of the adjuster. That is just an illustration of how a garment manufacturer can't tell there is a defect in the material until it is cut up and reaches the presser. When you unfold a piece of goods naturally you see creases in it. Because of my experience, I always take a piece of material to the presser first to see if he can iron out those creases. If they don't come out, that is the end of that. (Laughter) But up to the present time I have not been able to tell which creases would come out. If I give the material to the cutter to cut it up into garments then of course I have no redress. If I have cut up the material I can't ask for any sort of adjustment on it. Invariably the adjuster will come back and say, "The dyer won't allow any adjustment on creases." That is about as far as I get on it.

Mr. Stern: By "creases," I believe Mr. Kurash means the double crease running lengthwise.

Mr. Kurash: There is a double crease. Then there is a crease that runs across the width of the goods, too.

Mr. Stern: Where the goods are folded?

Mr. Kurash: Yes.

Mr. Stern: In the length of the piece?

Mr. Kurash: Yes.

Mr. Stern: And the crease is formed on the yarn, each 45 inches, is that what you mean?

Mr. Kurash: Yes, that is what I am referring to.

Mr. Stern: I believe most of the dyers here will say that practically all the goods that have been delivered into the New York market for years have been in book fold, with those creases in each piece, and throughout last year and the year before we never had one complaint from a customer on that score. This year however we have had complaints. We thought possibly, as Mr. Gaede suggested, the goods might have been lying in stock under pressure, so we conducted some experiments. We received goods from the dyer, from Paterson, and within about five hours after the goods were folded over at Paterson we shipped them to a garment manufacturer, who tried to iron out the creases.

Of course, it comes to a matter of degree of elimination of the creases. Some are eliminated more and some less.

As a result several months ago we decided to put all our weighted materials up on tubes. I know that the majority of the manufacturers have their merchandise sent in in book folds.

Why we haven't had those complaints in previous years is the question I should like to ask you gentlemen. Why, as Mr. Kurash says, is it that all of a sudden the iron cannot take out these creases, and every single day merchandise is being folded and sent by dyers to silk manufacturers in New York City who are shipping them out? Perhaps Mr. de Got has something to say on that.

Mr. de Got: I quite agree with you, Mr. Stern.

Mr. Stern: I don't see any fundamental reason for it. The dyer claims there has been no change—you gentlemen know that better than I do—in the processing. I have taken irons—steel irons and every other kind of iron—and tried to eliminate those creases, without success. Someone here ought to be able to answer that question. It is a very serious problem because there are thousands and thousands of pieces being cut up every single day, going into garments, and those creases are being noticed at the present time.

The way we are getting around that is by putting them up on tubes.

Mr. de Got: May I ask a question? I haven't asked any yet.

We are selling—I should say "we were"—a necktie manufacturer a pure dye crepe for lining ties. It is a very lightweight crepe. I don't know the exact construction of it. When the iron passed over that tie, on the silk itself, it scorched immediately, even if the iron wasn't excessively hot. I went up there ot see what it was all about because they were using an awful lot of goods and they had been using it right along, and all of a sudden on shipments going into that plant the silk would be scorched, everything except the whites.

There are a great many here who can answer that question probably. I wonder if there is one who would, or two, and have a discussion on it. As I say, the whites do not scorch. It is the same goods. It is all handled by the same dyer. Probably that dyer has one of his men here tonight. I don't know. But the goods scorch in colors, not whites.

This necktie manufacturer lines his ties with another silk that we don't supply him with. It is a sort of jacquard effect. And that silk does not scorch. It isn't the ironing, evidently, that causes the scorching.

Mr. Freedman: Mr. Chairman, in answer to Mr. de Got's question, I would suggest that they look into the type of finishing material that is being used. That may be what is causing the scorching.

President Wood: Why would it affect the colors and not the whites?

Mr. Freedman: They may be using certain finishing materials in the colored materials that they are not using in the whites. There may be certain starches or sugars in there.

Mr. de Got: I will buy a dinner for any man who can answer that question, because if he does we will get back a good account. (Laughter)

Chairman Gaede: Here is a chance for someone to win a dinner. (Laughter)

Mr. Stern: Can you answer that question that I asked, Mr. Gaede?

Chairman Gaede: Coming back to Mr. Stern's question, there is only one thing that comes to my mind just now. The only thing that I can conceive of causing a thing of that kind would be the folding machine itself. It grips the goods on each alternate fold. The tension on the springs may be too strong and grip the goods so as to form too deep a crease in the goods. But that would be only in an exceptional case. Why it should be such a general condition it is hard to understand. You would think that with the machines getting older the springs would become weaker, if anything, rather than stronger.

I can't answer the question.

Mr. Stern: Have you had that same complaint, Mr. de Got?

Mr. de Got: Yes. As a matter of fact, putting the goods up, as you say, on tubes is a common practice today, just on account of that, that the crease will not come out. Whether it is because the customer is becoming fussier, or not, I don't know. Of course we know that when business is poor, customers are more apt to return goods than when business is good. They will return goods for any insignificant reason. But I don't think it is as bad as that because, no matter how good business was, they couldn't have accepted goods with those creases in. They won't come out with an iron, either.

Mr. Stern: Have you had that experience with fresh merchandise that has come right from the house only a short time?

Mr. de Got: Yes. It is particularly true of fresh merchandise because, as you know, the colors for the cutters come in and go right out. They are not carried in stock a long time. They are in a great many cases high style colors and as soon as they come in the house as a rule you are in a position to ship them out, at least some of them, so that the goods aren't in stock long enough to have this weight on them that would establish creases in the goods.

Chairman Gaede: Is there anyone in the room who has any suggestion to offer as to why these creases will not come out of the goods now, whereas they evidently did come out of the goods a year or two ago?

Mr. Adolph Winkler: It would seem to me that the goods are more weighted than they were formerly. In my line of work I find silk, for instance, that contains only forty-five per cent silk, the rest being metal. And if you take a sheet of tin and fold it you never can iron it out. Probably the same principle applies to the silk weighted so heavily that even an iron will not straighten it out. That may be one explanation for it.

Chairman Gaede: Do you think that may be the answer, Mr. Stern?

Mr. Stern: No, it is the same quality as we had last year, weighted by the same dyer, in a similar manner, containing the same percentage of metal, and we had no trouble at all last year.

Mr. Winkler: I don't know what can be the cause of it, then. Maybe if you investigate it you will find it is more heavily weighted than formerly.

Mr. Stern: No. We have gone into that.

President Wood: The same dyeing price?

Mr. Stern: A little cheaper. (Laughter) Our competitors forced the price down. (Laughter)

Mr. Louis S. Zisman: Mr. Gaede, a suggestion has been made that may have some value. I know nothing about this matter of creases on silk but the suggestion was made that possibly weather conditions had something to do with it. The unusual amount of moisture may have something to do with the physical condition of the silk. What do you think about that?

Chairman Gaede: We have humid conditions in various seasons. Of course, we are having an unusual climatic condition just now but we have had the same humidity at other times. The humidity isn't any different than usual. It may be slightly above normal but generally speaking it is no different.

Mr. Stern: We noticed the first complaints around the months of September and October, and they will become more numerous as time goes on. I think you gentlemen realize that we have been dyeing mostly dark colors. Creases will not show up as much in dark colors as they will in light colors. As soon as we go into light colors we are going to get a great many more complaints than we have had up to the present time. Have you found that same condition?

Mr. de Got: You will be running into light colors from now on.

Mr. Stern: Yes, and that condition will show up a great deal more, so it is very necessary for you gentlemen to get after that, because there are going to be endless complaints and the man who must stand for them is the silk manufacturer who orders his goods to be booked folded, because he gives those instructions and he really puts them in. That is what I am told.

Mr. Kurash: I just want to ask Mr. Stern a question, to make the problem a little more difficult.

I have found creases not only in weighted but in pure dye goods. How do you account for that?

Chairman Gaede: Did you wish to say something, Mr. de Got?

Mr. de Got: Yes.

As far as we can ascertain, the raw silk that we use in manufacturing the goods is the same today as it was years ago. We don't know anything about the tin, however. This question came to my mind: Do you get your tin from the same source of supply that you have gotten it from for the past few years? Could it be that the tin itself has some ingredients in it today that would cause this creasing?

There is no dinner with that question. (Laughter)

Chairman Gaede: I am afraid that some of the chemists, in answering that, would say that, knowing the chemical reactions there as they do, the tin would have no bearing on it.

Dr. Jos. F. X. Harold: No, the tin is perhaps one of the purest chemicals known. Stannic chloride is one of the purest forms of industrial chemicals, except perhaps lead, which runs about three decimals before you come to a percentage of impurity. The stannic chloride, being made by fractional distillation, is practically free from any trace of any other article. It may have a slight amount of chlorine but that is about all that it can have. It is not a crude fluid made by adulteration. It is a pure fluid made by fractional distillation, which is the usual means of making an article very, very pure. I don't think you can trace it to that. And it is usually made from block tin of the best variety. The competition between the few manufacturers of stannic chloride forces them to deliver a very good product. I don't think they have ever successfully laid any trouble at the door of variation in tin supply.

Chairman Gaede: Are there any further questions or answers on this problem? It is one of those things that will take a little time to solve. I don't think that we can have another research committee appointed for this problem. It is one of those things that will solve itself without a doubt as many of these problems have solved themselves. This is only a few months old. Some

of them take a good many years and then they are not solved.

Mr. Kurash: I just want to say that I will guarantee you to get an answer for that problem as soon as I have some more creases I am going to find out the cause of them. I am going to have the dyers or the silk manufacturers with whom I do business get an answer from some chemist or some dyer with whom they do business. They will go to someone who will have to give an answer on that.

Chairman Gaede: Well, you may get it that way, Mr. Kurash. We can't seem to find the answer tonight. Mr. Wood says it is in the bag. (Laughter)

Are there any further questions?

Dr. Harold: I have heard that there are some tin weighters who instead of using the normal practice of reserving the silicate for the last bath have tried to get tin weighting with silicate in the earlier passes. Such a practice of course would be deleterious and would certainly cause a positive setting of a fold, as compared with the phosphate, which is a rather finely crystalline compound. Most tin weighters reserve their silicating for the last bath and the gravity of the silicate in the last bath is usually very faint, about half a degree twaddle. Some say it is just enough to make the hydrometer show a crack. But if any tin weighter is getting into the habit of relying on his silicate for a substantial increment of the weight he is certainly running into difficulty of setting and making a fairly permanent set to his folds.

Mr. Walter E. Hadley: That premise would be upset in that it seems to be quite general, according to the discussion.

Dr. Harold: It is against all standard practice.

Mr. Hadley: I have gained the impression from the discussion that the creases appear not in the material from one manufacturer, but from many. It seems to be quite general, and a growing condition, which would eliminate that particular method of treatment as the cause of it.

Dr. Harold: I don't know that we are able, Mr. Hadley, to say that it occurs in the material from many manufacturers. All that we have apprehended is that it has been reported by many consumers. I don't think we have clearly established how many people are guilty as far as the tin weighters are concerned.

Mr. Kurash: May I say that I have found these creases to exist in merchandise that invariably had been on a silk man's shelf for some time, possibly a year or more? That may possibly be a solution to the crease situation.

Chairman Gaede: I might answer that by saying Mr. Stern and Mr. de Got both said they had experienced this on goods which had been dyed very recently, on freshly dyed and freshly finished goods. They both said it had shown up in such material particularly.

Mr. Kurash: I found that it occurred in merchandise that the manufacturers had had for quite a while.

Mr. Winkler: I want to substantiate the statement of Dr. Harold. He mentioned the possibility of silicate being used. This was actually what happened, in my analysis. A piece of cloth was analyzed and found to contain, I would say, speaking roughly, fifty per cent of weighting. Twenty-five per cent of it was silicate and the other was tin. This perhaps has something to do with making the creases more permanent than formerly when silicate was not used so regularly as it is now.

Mr. E. J. Volkman, Jr.: Mr. Stern made the assertion that he went into the matter and that the goods he used before were the same as those he is using at present.

Mr. Stern: We didn't know what percentage was silicate and what percentage was tin. We knew that the cloth originally went down from the grey weight of 100 to 75, then up to 140. We didn't know how many parts were silicate.

Since when has the practice of increased silicate started among the dyers? (Laughter) We didn't have this trouble until last September. I mean that might offer a clue.

Mr. Chase: Didn't one of the speakers say that it was also experienced on pure dye as well as weighted silk?

Mr. Kurash: Yes, I have found that to be the case. I have found that in pure dye silk. While it wasn't as prominent as it was in weighted goods, it existed just the same.

Mr. F. M. Bonnett: I should like to ask Mr. Stern if the crease running warp-wise presses out.

Mr. Stern: We find that both creases remain in. Of course, this has been brought out more forcibly this year due to the type of dress that has been made. Most merchandise today is being cut on the bias and you get a clear effect of the warp crease and then, crossing it, convex and concave effects of the yarn crease.

Mr. Bonnett: I had in mind that the goods on reels did not crease.

Mr. Stern: Both creases show up and you cannot iron them out. We experimented by having the dyer when he finished the goods send them over within five hours after it left the folding crane. We sent the goods to a dress manufacturer who pressed the cloth damp, under the same conditions as he usually does. We tried every means of pressing out the crease, going as far as pressing the crease without a pressing cloth but we couldn't get the crease out.

Chairman Gaede: Mr. Stern, you speak of yarn reels. Are the goods doubled and then put on flat reels, or are they full width on round reels?

Mr. Stern: You mean the way we are getting them in today?

Chairman Gaede: Yes.

Mr. Stern: They are put up on the 42-inch tube, which has no creases at all the way it is put up today—no warp crease and no crease with the filling. It makes it a very much more difficult job to handle.

(Continued on page (124) 166)

Proceedings of the American Association of Textile Chemists and Colorists

A Report on the Spectral Reflection of Eleven Samples of Dyed Cloth

Prepared by the Colorimetry Section of the United States Bureau of Standards at the Request of the Sub-committee on Fastness to Washing of Dyed Silk of the American Association of Textile Chemists and Colorists.

I. Purpose of the Report

THE purpose is to put on record data which are suitable and adequate to specify these colors, so that the reproduction of these present standards at some future time may be verified without depending upon the permanence of the color of these particular specimens. The adequacy of the present data is limited, however, by the fact that the colors of samples such as those under consideration may vary somewhat with different conditions of illumination and observation; and the duplication of the present data with other samples at some future time would be a guarantee of the reproduction of the colors of the present standards only for the case in which the samples are viewed normally under completely diffused illumination, that is, under the conditions obtaining in the making of the present measurements (see below). To insure that future samples complying with the present specifications would match the present samples under all conditions of illumination would require more extensive measurements.

II. Description of Material

The samples are as follows:

No. 1. 5% Ciba Blue 2B Powder, original dyeing.
No. 2. A portion of No. 1 washed in test 1 (see below).
No. 3. 2% Erio Chrome Azurol B, original dyeing.
No. 4. A portion of No. 3 washed in test 1.
No. 5. A portion of No. 3 washed in test 2.
No. 6. 2% Wool Violet 4 BN, original dyeing.
No. 7. A portion of No. 6 washed in test 1.
No. 8. A portion of No. 6 washed in test 3.
No. 9. 2% Patent Blue A, original dyeing.
No. 10. A portion of No. 9 washed in test 2.
No. 11. A portion of No. 9 washed in test 4.

Introductory Note by Sub-Committee Chairman,

WALTER M. SCOTT

On December 6, 1929, the Research Committee of the American Association of Textile Chemists and Colorists authorized the Sub-committee on Fastness to Washing of Dyed Silk to prepare dyeings of the four standards which had been tentatively adopted as representing the minimum limits for four classes of fastness to washing. Accordingly, a suitable quantity of silk fabric was woven and dyed with each of the four dyestuffs which had been selected for the purpose. Sets of these silk washing standards are now available and may be purchased from the secretary of the A.A.T.C.C.

In order to have a permanent record of the original color of the standards and of the alteration in color of these standards when subjected to the standard washing tests, it was decided to obtain spectral reflection data on the color of representative samples before and after washing. The eleven samples mentioned above include the four standard dyeings prepared by the silk committee together with one wash test made on Standard No. 1, and two wash tests made on each of the other three standards. A detailed description of these samples is given later in the report.

The committee is indebted to the Colorimetry Section of the U. S. Bureau of Standards for making the necessary measurements, compiling the data and evaluating the results. The following report of B. S. Test No. Tp64397 was received from the Bureau of Standards in May, 1931, and is now printed by permission of the Director of the Bureau.

The method of test is described in the 1930 Year Book of the A. A. T. C. & C., pages 89 and 90. The essential differences between the tests are as follows:

Test	Volume of Soap Solution* c.c.	Time of Tests hour	Temperature of Test
No. 1	200	1	180° F. (82° C.)
		mins.	
No. 2	100	10	160° F.)71° C.)
No. 3	100	10	120° F. (49° C.)
No. 4	100	10	85° F. (30° C.)

The standard method of the A. A. T. C. & C. for testing "Fastness to domestic washing and laundering" of dyed silk depends on the "alteration in color" of the four dyeings in the washing which has been applied to them in the above listed series of tests. The classification follows:

Class 1. No greater alteration in color than the standard for this class in Test 1.
Class 2. No greater alteration in color than the standard for this class in Tests 1 and 2.
Class 3. No greater alteration in color than the standard for this class in Tests 1 and 3.
Class 4. No greater alteration in color than the standard for this class in Tests 2 and 4.
Class 5. Greater alteration in color than in any of the first four classes.

III. Quantity Reported

The quantity herein reported (B_x/B_o) is the ratio

$$\frac{\text{Brightness of the Sample}}{\text{Brightness of Magnesium Oxide}}$$

as a function of wave length under the following conditions:

(1) The sample and standard (MgO) are under equal illumination.

*No rubber balls are used in the jars for any silk tests.

(2) The illumination is completely diffused.

(3) The line of sight with regard to which brightness is measured is perpendicular to the plans of the surfaces of the sample and standard.

IV. Apparatus and Method

Detailed description of the apparatus and method is given in B. S. Research Paper No. 30. In this publication will be found:

(1) Description of the Konig-Martens spectophotometer and general theory of its use (pp. 814-823).

(2) Description of source for reflection measurements (pp. 798-803) and of mechanism for the insertion and interchange of the sample and standard (pp. 807-809).

(3) Method of use of the instrument for reflection measurements (pp. 825-829, 836-838, 850-857).

(4) Description of the MgO standard and the porcelain working standard and discussion of the equivalence of the illumination to the ideal completely diffused condition (pp. 850-857).

(5) Discussion of the polarization problem and the means taken for the elimination of errors due to polarization (pp. 825-829).

V. Experimental Procedure

In addition to the above general information, the following details may be noted:

1. *Polarization Tests*

Samples having marked regularities of surface structure, such as silks, velvets, etc., may cause appreciable polarization of the light reflected at right angles from their surfaces, even though subjected to completely diffused illumination. The present samples were tested for such effect under approximately diffused incondescent illumination with a Martens photometer. Small, but definite polarization of the normally reflected light was noted in most cases, although the maximum effect was less than 3 per cent (ratio of polarized to total light). However, errors from such effect were eliminated in the reflection measurements by:

(1) Cutting the sample so that when inserted in the spectrophotometer, the plane of polarization of the reflected light was approximately at 45° to the planes of polarization of the instrument.

(2) Following the usual method of interchange of sample and working standard white.

Explanation of how this procedure eliminates polarization errors is given in B. S. Res. Paper No. 30, as noted above.

2. *Preparation of Samples*

Two sets of 4 x 4 inch samples were submitted. From each of the 11 samples of each set two pieces were cut, each piece 29 x 39 mm., to fit the holder of the spectrophotometer. Four 29 x 39 mm. samples were thus available for test, and in all measurements on the spectrophotometer the sample being measured was baked by the other three samples of the same designation, and further backed by black paper. The four samples of the same kind were further designated as a, b, c, and d, respectively.

Measurements were in all cases made on the sides of the samples that were labelled when received (first set, unmounted) or that were exposed to view (second set, mounted on cards in black binder). The small 29 x 39 mm. samples were numbered in ink on the same sides as designated just above for the submitted samples.

3. *Nature and Extent of the Measurements*

Each of the "a" samples was measured relative to MgO (via the porcelain working standard) in the usual manner—every 20 mμ from 420 to 720 mμ (see B. S. Res. Pap. No. 30, pp. 836-838, as noted above). In several instances, however, the values of B_x/B_o obtained throughout the spectrum on the washed samples were so nearly like those obtained on the unwashed samples of the same dyeing as to make the respective differences subject to considerable uncertainty.

In these cases a direct comparison of the brightnesses of the washed and the unwashed samples was made on the spectrophotometer as a function of wave length. No. 2 was thus measured relative to No. 1, No. 4 and No. 5 relative to No. 3, No. 8 relative to No. 6, and No. 11 relative to No. 9. The particular samples used for these measurements were in every case samples previously used only for backing and not previously directly exposed to the radiant energy of the source.

The directly observed ratios were then compared at each wave length with the ratios computed from the values of B_x/B_o obtained on the "a" samples in the first series of measurements. In some cases these ratios differed consistently by several per cent throughout the spectrum. The magnitude and consistency of these discrepancies indicated that they were due to real differences between samples supposedly identical and not to experimental uncertainty of determination. Furthermore, the discrepancies seemed of such a nature as would result mostly in differences of brightness rather than in differences of trilinear coordinates.

To assist in getting the true ratios of the washed to the unwashed samples, the brightnesses of the former were measured relative to those of the latter on the reflectometer with sunlight filter. This was done for the five cases noted above where the washed sample differed but little from the unwashed sample. In each of the five cases these relative measurements were made on all four samples, each measured sample being backed in turn by the other three as in the spectrophotometric measurements.

Silk Samples Submitted by A. A. T. C. C. Through B. S. Div. VII, Sec. 2. B. S. Test 64397

$$\frac{\text{Brightness of Sample}}{\text{Brightness of MgO}} = \frac{B_x}{B_o}$$ for completely diffused illumination and line of sight perpendicular to surfaces of sample and standard.

Wave Length ($m\mu$)	B_x/B_o										
	1	2	3	4	5	6	7	8	9	10	11
380	0.118	0.105	0.150	0.165	0.154	0.235	0.262	0.216	0.107	0.206	0.107
90	127	115	169	188	174	248	287	236	112	214	112
400	136	125	188	208	193	263	313	257	118	226	118
10	144	134	204	227	211	274	338	276	128	248	128
20	150	142	222	245	227	285	364	292	147	284	148
30	154	147	236	258	241	290	385	304	197	340	199
40	153	147	246	265	250	288	405	308	307	410	311
450	148	142	250	267	253	277	418	296	400	470	403
60	141	135	246	263	248	253	428	272	443	502	446
70	132	126	234	252	237	218	432	238	452	520	457
80	123	117	217	236	219	180	434	197	443	530	450
90	112	107	198	215	200	142	430	156	423	532	431
500	100	095	177	192	178	103	422	118	395	524	404
10	085	080	153	168	154	068	410	082	360	500	370
20	070	066	130	145	131	047	387	055	322	465	332
30	056	052	110	124	110	035	357	038	276	428	288
40	046	043	093	105	093	028	334	030	231	384	245
550	039	037	077	087	077	026	310	027	186	338	199
60	035	033	064	072	064	025	295	025	145	292	157
70	032	030	056	062	056	025	283	024	105	249	115
80	030	028	052	056	050	025	273	024	075	210	083
90	030	028	049	052	047	025	265	024	058	177	065
600	031	028	047	050	045	025	261	024	045	148	051
10	033	030	047	049	045	026	280	025	037	122	042
20	035	032	047	049	045	031	325	032	032	101	035
30	038	036	048	050	046	045	376	048	028	083	030
40	044	043	049	052	047	074	437	086	026	072	027
650	056	054	052	056	050	129	495	150	028	075	029
60	072	070	058	064	057	198	550	228	035	109	036
70	093	090	069	078	068	272	586	300	052	170	055
80	118	115	088	101	086	342	617	363	096	245	102
90	150	146	119	132	118	403	630	418	163	326	171
700	184	180	159	178	160	463	642	463	240	412	251
10	215	214	212	232	217	520	652	523	327	500	334
20	238	242	264	296	280	570	659	569	407	577	410
Dye	5% Ciba Blue 2 B Powder		2% Erio Chrome Azurole B			2% Wool Violet 4BN			2% Patent Blue A		
Treatment	Original Dyeing	Washed in Test 1	Original Dyeing	Washed in Test 1	Washed in Test 2	Original Dyeing	Washed in Test 1	Washed in Test 3	Original Dyeing	Washed in Test 2	Washed in Test 4

Bureau of Standards, Colorimetry Section
Measurements by M.E.B.—Report by K.S.G.

VI. Reduction of Data

The average of the four determinations of relative brightness made on the reflectometer was, in each of the five cases under consideration, taken as the correct value. The spectrophotometric data were then adjusted by the following procedure so as to give these same average values:

(1) Two sets of values of B_x/B_o were available for the washed samples—those obtained by direct measurement and those derived by multiplying the values of

B_x/B_o for the unwashed sample by the observed spectral ratios of brightnesses between the washed and unwashed samples. These two sets of values were averaged.

(2) The brightnesses of the samples (relative to MgO) were then computed for sunlight, using the average values of B_x/B_o for the washed samples (as derived under (1) just above) and the observed values of B_x/B_o for the unwashed samples.

(3) The ratios of computed sunlight brightnesses for the washed and unwashed samples were then compared with the average ratios as observed on the reflectometer. In two of the five cases the ratios disagreed by less than one per cent. In the other three cases a correction factor was obtained.

(4) The average values of B_x/B_o for these three washed samples were then multiplied respectively by these factors so that the computed ratios of sunlight brightnesses would check the average values obtained on the reflectometer.

The values of B_x/B_o were then plotted for all the samples—for Nos. 2, 4, 5, 8, and 11, as adjusted by the procedure described just above, for Nos. 1, 3, 6, 7, 9, and 10, as directly observed without adjustment. There were plotted also values of B_x/B_o obtained for these 11 samples at 405 and 436 as determined in the Textile Section, the illumination being approximately unidirectional at 45° and the line of sight being at right angles to the surfaces. These values assisted in the estimation of values from 430 to 380 mμ.

VII. Tabulation of Results

Smooth curves were then drawn to best fit the plotted values. In most cases the curves pass through the plotted values; in a few cases the curve deviated from the plotted values in such a way as to correct for an apparent small error in the data. Values of B_x/B_o were thereupon adopted at every 10 mμ from 380 to 720 mμ and are given in the accompanying table.

VIII. Remarks

Various uncertainties enter into these tabulated values. These arise from:

(1) Variations of reflectance from one sample to another of the same kind or over different parts of the same sample. This may cause uncertainties of several per cent of the value, so far as the absolute values of B_x/B_o are concerned, but the relative values of the washed and unwashed samples should be approximately correct, because of the adjustment of the values of the washed samples by the procedure described above.

(2) Changes in the samples during the measurements. The rather intense radiant heat to which the samples are exposed caused slight but perceptible fading of the samples in all cases, as judged both by the unexposed strip around the edge of the sample and by comparison with the unused part of the original sample. The effect was most noticeable with Nos. 6, 7, and 8. In these cases the spectrophotometric data showed changes of approximately +0.002 at 560 mμ, —0.01 at 460 mμ, and —0.02 at 660 mμ. These changes thus may amount to several per cent of the value and may accordingly cause uncertainties in absolute values as great as the differences in samples of the same kind noted just above. However, since the washed and unwashed samples show changes of the same nature, the relative values should be approximately correct. For this reason, in addition to the considerable difficulty of accurately making such corrections, the values were in all cases used as obtained without attempting to correct for the slight permanent change occurring during the measurements.

(3) The usual observational uncertainty. This is considered to be less in importance than the two uncertainties noted above, except perhaps in the violet and extreme red. In the violet, as previously noted, the adopted values are based upon data from the Textile Section as well as upon data from the Colorimetry Section.

In conclusion, therefore, it may be stated that the values given in the table, considered as representative of both sets of samples submitted, are uncertain by a few per cent of the value. However, where the washed and unwashed samples are nearly alike, the respective ratios of values may be considered more nearly correct and representative than either set of values by itself.

MEETING NEW YORK SECTION

(Continued from page (120) 162)

Chairman Gaede: You haven't had any experience I suppose with the folded goods on flat reels, that is, drum boards?

Mr. Stern: Where it has only the warp crease, the one crease?

Chairman Gaede: Yes. Have you had any experience on that? Do the creases remain in there just the same?

Mr. Stern: Yes. I think if all of you gentlemen would take some pieces that have been lying around your plants for a few days—they usually go out in a couple of days, of course—and experiment with them with a hot iron you will find out that what we say is true. It is a very important thing to overcome, because nobody seems to be responsible for it. So the customer is right.

Chairman Gaede: We are very much indebted to Mr. Kurash and to Mr. de Got for coming here tonight and presenting their problems to us. I will ask for a rising vote of thanks to our speakers.

...A rising vote of thanks was extended following which the meeting adjourned, at ten-fifteen o'clock....

AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
Professor of Chemistry and Dyeing, Lowell Textile Institute
Directing Editor

NORMAN ALBIN JOHNSON
Managing Editor

MYRON DREW REESER
Advertising Manager

Published biweekly by
HOWES PUBLISHING CO., INC.
440 Fourth Avenue, New York City

A. P. HOWES, President — M. D. REESER, Secretary — H. F. CRAWFORD, Treasurer

Subscription price $5.00 per year; Canadian $5.50; foreign $6.00

Volume XXI February 29, 1932 No. 5

RAYON EVILS

WITHIN the last two years, a most regrettable condition has arisen within the rayon industry. We refer to the deplorable practice by certain concerns of adulterating circular knitted rayon fabric by means of weighting and over-stretching. The practice crept into the industry approximately five years ago and has gradually become more general and more vicious in nature. The excessive adulteration of the past two years has finally caused an unconscious "Consumer Strike" on the part of the purchasing public.

Loss of sales became so serious that an organized protest was recently made by the retailers of the finished fabrics and the producers of the rayon yarn,—the knitters being more or less "put on the carpet." To date the only constructive result has been a decision to ask the U. S. Bureau of Standards to cooperate in an effort to provide standards for the trade as regards the weighting and stretching of rayon fabrics. What the outcome will be is uncertain but if these practices are not stopped or controlled within acceptable limits, the effect on the entire rayon industry will be nothing short of disastrous.

Excluding the retailers who, of course, are also vitally interested, there are three factions which enter into this controversy. They are the producers, the knitters, and the finishers and dyers. When we consider that there are only about twenty-five units of production concerned it seems strange that no agreement can be reached among the parties involved whereby these evils might be abolished. (It is only fair to state that all concerns engaged in rayon manufacture do not carry on these practices and in some cases others are forced to do it in order to meet competition.) It is still more strange when we realize that there are only about a half dozen rayon producers manufacturing practically the entire rayon output. It is the general belief that most of the manufacturers own, control, or subsidize (through the extension of credit or other means) a number of knitting mills. If this be true, they have, then, the power to prohibit the practice of weighting and stretching in their own mills. However, most of them take the attitude that weighting and stretching are bad features, but—"What can we do about it?" Something should be done about it, and done soon, if the rayon industry is not going to suffer tremendously.

Take the matter of weighting. It is possible, in the laboratory, to weight rayon to as high as thirty per cent, thereby temporarily enhancing the appearance of the fabric. Goods have been placed on the market containing as high as twenty per cent. When it is considered that a large proportion of this weighting washes out in the first wash, it immediately becomes apparent that this can only have a decidedly unfavorable effect on the consumer.

Stretching, the twin evil of weighting, has also been carried to regrettable extremes. Knitted fabrics have been placed on the market after being stretched to more than 30 per cent of the total area. In the first washing the fabric returns to its original size. Imagine the consumer reaction in such cases!

The situation has now gone so far that certain knitters and finishers, observing the "handwriting on the wall," are preparing to take care of fabrics other than rayon,—using them instead of the rayon. They have foreseen what the direct result will be and are making ready to cope with the change in consumer demand. They realize that continued weighting and stretching will eventually kill the rayon market and they are planning for the future with this point in view.

It would not be so regrettable if only the offenders were made to suffer, but the bad effects are being felt throughout the entire industry. Although the practice of weighting has been limited to knitted fabrics, the stigma which has become attached to this particular type is at the same time causing the crepes to acquire the same bad reputation. That makes conditions more serious and those who have not resorted to such questionable practices are suffering just as much as those who introduced the practices and those who are continuing them. Competition is very keen in the rayon industry and when it becomes necessary to cheapen the goods to such an extent that the industry itself suffers, there should be concerted action among the factors involved to prevent the industry from being seriously curtailed.

After registering the complaints as has been done above, it is only proper that we should make some suggestion to remedy conditions. For that reason we wish to pass on to our readers a suggestion, recently offered to us, which we consider to be exceptionally good. The

plan as outlined to us consists in having the firms vitally interested establish their own standards, and police their own industry by means of a control laboratory aided by intelligent sampling. Some disinterested party would be in charge of the sampling and would be free to sample stocks at all times. The analysis as determined by the control laboratory would be published and supplied to all the firms interested. Such a system of self-policing, subscribed to by all the firms, and the publishing of the findings should bring results. The future of the industry lies in the adoption of some such method. It is essential that some definite action be taken immediately.

L.T.I. Alumni Meeting

A meeting of the New York Section of the Lowell Textile Institute will be held at the Happiness Restaurant at 535 Fifth Avenue, near 44th Street, on Tuesday night, March 8th, at 6:30 P. M. The event will be known as "Old-Timers' Night," as it is expected that a large number of the earlier graduates will be present. A prominent textile man will address the meeting, to be followed by a business meeting. There will be a charge of $1.00 for the dinner.

New "Balanced Bleach"

After several years of research and investigation, Robert A. Phair, Chief Chemist of H. Kohnstamm & Co., has developed a bleach which he terms a "balanced bleach." The principle involved is that the action of the bleaching agent is "toned down" sufficiently so that it will remove stains from cloth before it seriously affects the strength of the fabric. Tests reported by the U. S. Testing Co. show the following facts:

Average Tensile Strength

With unbalanced bleach		With "balanced bleach"	
Warp	Filling	Warp	Filling
27.7	23.2	36.3	28.6

The amount of available chlorine in the unbalanced bleach involved was 12.73 gr. per 100 and in the balanced bleach was 14.14 gr. per 100. The product has been developed for use in laundries.

Albatex WS

The Society of Chemical Industry in Basle brings on the market a new textile assistant

Albatex WS

which is said to be of especial interest for the dyeing of mixed goods of animal and vegetable fibres, such as half wool, half silk, wool and artificial silk and silk and artificial silk. This product is distributed in this country by the Ciba Co.

New Carbic Colors

The Carbic Color and Chemical Co., Inc., recently placed on the market two new Indigosol dyestuffs which, it is claimed, belong to the fastest group brought out so far. These colors are: Indigosol Golden Yellow Irk and Indigosol Brilliant Pink 13B. Pamphlets illustrating the uses of these dyes may be obtained from the company.

New du Pont Dye

Pontamine Diazo Blue 5GL has recently been announced by the Dyestuffs Division of the Organic Chemicals Department of E. I. du Pont de Nemours & Company. This dyestuff, when developed with beta naphthol, is said to be greener and brighter than Pontamine Diazo Blue 3G and greener than Pontamine Diazo Blue BR. It is said to be used extensively for medium and light shades on cotton and rayon when a pure white discharge is desired. It is claimed to be fast to light, for a diazo color, being superior in this respect, as well as in dischargeability, to Pontamine Diazo Blue 3G. It is further stated by the company that Pontamine Diazo Blue 5GL is very soluble, levels and exhausts well, and may be applied with satisfactory results in all types of machines.

New General Circulars

The General Dyestuffs Corporation have recently issued circulars on the following new products: Palatine Fast Brown GGNX for dyeing men's wear and ladies' dress goods and for knitting and carpet yarns; Palatine Fast Yellow 6GNXX for the same purpose; Indanthrene Brilliant Orange GR Double Paste; Indanthrene Brilliant Pink 3B; Fast Corinth Salt 3B for use with Naphthols of the AS range; Viveral E Conc., a new desizing agent; Indigosol Brilliant Pink I3B and Indigosol Golden Yellow IRK for printing by the chlorate style; five new rapid fast colors, viz.: Scarlet RH, Red FGH, Red IRH, Brown CGH and Brown BH; and Indocyanine BA producing a bright navy blue. A new sample card has just been issued on "Indigosol Dyeings on Woolen Yarn" illustratin the full line of Indigosols on woolen yarns in straight dyeings and combination shades. A new card has also been sent out illustrating "Shades Fast to Salt Water on Half-Wool Knit Goods" showing a number of fashionable shades for sweaters and bathing suits.

Dyeing Silk and Chlorinated Wool in Mixed Fabrics*

By GEORGE RICE

Silk mixed with about equal proportions of chlorinated wool is now used fairly extensively in the manufacture of men's suitings, dress goods, and certain kinds of drapery and upholstery fabrics. Chlorinated wool in mixed goods almost always absorbs more dye than wool which has not been so treated, and for this reason special preparations are necessary to obtain level colors. Failure to do this accounts for much of the unsatisfactory work which I have seen recently in dyehouses where the dyeing of silk and chlorinated wool mixtures was being done. Samples of blotchy, shady and spotty goods of this type have been brought to the author for a report on the reasons for the poor dyeing.

CHLORINATED wool is a chemically-treated wool, as all dyers know, but for some unaccountable reason the fact that the chlorination process leads to a definite change in some of the wool's properties is disregarded by some dyers. They dye the blend of silk and chlorinated wool just as if the wool had come straight from the sheep's back and the scour room to the dye vats. Wool which has been successfully treated for an unshrinkable finish in unison with silk or rayon or any of the other fibres cannot be so handled with the surety of obtaining good colors. There are conditions under which chlorinated wool has an increased affinity for dyes as well as an under affinity. A seriously over-chlorinated wool possesses that undesirable property of absorbing the dye heavily in spots, resulting in unlevel dyeing.

Often small traces of acids remain on the fibres following the chlorinating process, and these tend to brighten the fibres as soon as they are dyed. No way has been discovered yet of avoiding the use of acids, and when these hang on to the fibres in places, non-level dyeings result.

Excessive Chlorination

One piece of silk chlorinated wool dress goods material brought to us showed signs of early wear. It did not satisfy the normal wearing tests, although it had been manufactured of good stock, the yarns were well carded and spun and the weaving and finishing evidently efficiently accomplished. It lacked tensile strength and elasticity. Its color was poor. We found that the chlorination of the wool had been carried out by the use of the hypochlorous acid process, but had been excessively overdone, as could be seen by the yellowing aspect pervading throughout.

The yellowing is a sure sign of over-chlorination, and is usually accompanied by lowered resistance to ordinary wear, and other conditions of service. The piece of silk chlorinated wool dress goods referred to was damaged from a commercial point of view by the over-treatment given the wool to make sure of its unshrinkability.

For the same reason, the wool may have a decreased or an increased affinity for the dyes. Excess chlorine on the fibre can be removed after chlorinating with a dilute bisulphite bath, but this is not always done. Thus the dyer may get a glossier color than he contemplated. There are some dyes that do not appear to be affected one way or the other by under chlorinating, normal chlorinating or over chlorinating. If the fibres appear to be spongy and slimy, the indications are that extreme over-chlorination has been performed. Most of the fibres will dry out to their former stability but some will continue soft to the point of mushiness, much to the concern of the man who is supposed to get a level color on the goods: If he had the wool alone to dye, it would be different, but the pieces are made up of silk and chlorinated wool.

There is a tendency for the chlorinated wool to absorb the dye as soon as the piece is entered into the bath, especially if the dyestuffs are of the type that go easily onto wool. Sometimes this action so exhausts the bath that there will not be much color left for the silk. This fault can be controlled to some extent by avoiding high temperatures when the goods are entered. Very even, solid colors can be dyed on silk and chlorinated wool mixtures at a temperature of about 135 deg. F. Higher temperatures and a long boil enable the wool to get most of the dye at the expense of the silk. The dyeing is done with either acid or direct colors, with the addition of about 6 per cent acetic acid 28 per cent and about 20 per cent Glauber's salt crystals. The pieces are run for 40 minutes, the bath allowed to cool, and another 6 per cent acetic acid 28 per cent is added, followed by raising the temperature of the liquor to about 145 deg. F., and continuing the treatment for 35 minutes or longer if necessary, to get greater depth of shade.

Some dyers prefer to use the direct colors only when dyeing solid colors on silk and chlorinated wool mixtures for the reason that these dyes usually color both fibers more equally. The goods are entered into a bath contain-

(Continued on page 171)

*Dyer and Calico Printer.

Hussong Machines and Common Sense

By **HARRY FAIRCLOUGH**

To merit approval, I am not sure to whom the above title should be addressed, the employer or the dyer, therefore I am going to compromise and endeavor to be of some assistance to both in my efforts to somewhat clarify some of the trials and tribulations of colorists who use Hussong machines, and, if Mr. Employer should read these lines he may learn where some of his money is going and why he is worried over his cost of dyeing and occasional poor results. I have read so much and observed so many questions asked in textile magazines, that, as a colorist of over twenty years' experience, I felt that a short treatise on the subject might be of benefit to those, colorists or employers, who are continually falling short of that success to which all aspire in coloring textiles on a paying basis, as well as quality and quantity.

IT IS one thing to be a dyer, and quite another thing to be a dyer and make it pay.

It has been my experience that in most cases such failure is invariably due to lack of confidence rather than ability.

To users of Hussong machines, let me say, to my mind, a more efficient and economical textile yarn dyeing machine does not exist. Its operation is simplicity itself, and, if the boss dyer knows his business you have a combination that is bound to produce results. I have seen so many dyers disappointed with their results that they become prejudiced against the machine, when, if they would closely analyze the situation they would invariably find they are themselves responsible for the results, either through lack of confidence, or lack of ability, and I think in most cases it is a lack of the former.

Ability that is not supported by complete confidence is bound to produce unsatisfactory results, and, likewise, confidence without ability may prove disastrous.

What is needed is reasonable ability supplemented by complete confidence in that ability, and, above all, a complete confidence in your machine.

It has been my observation that there are three reasons that are usually responsible for bad work. First—incorrect amounts of chemicals. Second—poor choice of dyestuff, and lastly—lack of close supervision over machines by those in charge.

Let us consider the machine and the part played by it: We are all fully conversant with the simplicity of its operation, but I am not so sure that all users get the best out of it for the reason there is a diversity of opinion as to how to best operate it. That is, how long and in which way should the dye liquor be circulated for best results.

After years of close study and practical experience, I have learned that the finer the quality the more the circulation should flow upward for the best results with wool, cotton or rayon, and, as the grade or quality is lowered, best results are obtained with the downward flow in a ratio corresponding to the drop in the quality of the material. In other words, if the quality drops 10 per cent, use 10 per cent of the time on the downward circulation, and 90 per cent upward, continuing this procedure as the grade goes down, even to the point where, on a very low grade, the up and down circulation is evenly divided as to time.

Let me give you sound reasoning for this: The finer the grade the more closely it packs, thereby increasing the resistance against free circulation when the up circulation is used. Under these conditions, with the downward circulation, this resistance decreases, due to the fact that the material is then lengthened and, consequently, is not being as closely packed as is the case with the upward flow. Therefore, with this reasoning, it will be seen it requires more time under such conditions to pass the dye liquor through the material by the upward flow and, in my opinion, the ideal operation is to pass the liquor in both directions through the fiber equally. This cannot be accomplished by equally dividing the time, unless the resistance is equal in both directions. All this, of course, is contingent upon the machine being loaded to its capacity, which, by the way, is governed by the quality of the material in process. The finer the grade or quality, the greater the bulk, and, therefore, it follows that in a 500 pound machine, for example, that which would be a reasonable load of one grade would be an under load, or an over load of lower or higher grade. Therefore, good judgment is required in loading.

As a rule, medium grades can safely be loaded with 500 pounds, and lower grades can be loaded with a greater amount, but of finer grades, the quantity must be reduced accordingly. It has been the writer's experience that with very fine grades it is sometimes necessary to reduce the weight to 400 pounds. On the other hand, the load with very low grades can be increased to 600 pounds in a 500 pound machine with very good results. In a machine of this size, I have repeatedly dyed as much as 700 pounds on a low grade of stock, and with perfect results.

An excellent feature of this machine is the economy in labor, steam and power. From tests made by the author for the purpose of comparing the Hussong machine with a rotary skein dyeing machine, it was found that in order to obtain the same immersion of the skeins in the dye liquor that the material must remain in the latter about 60 per cent longer. In other words, to work the material one hour in the dye liquor in a machine of the Hussong type requires only one hour's application of steam, where-

as to give to the material the same exposure to dye liquor in the rotary machine would require somewhere between one and a half to two hours with the steam turned on. This is due to the fact yarn in the rotary machine is immersed in the dye liquor only part of the time. Furthermore there is a decided cooling element involved as the skeins are constantly passing from the dye liquor into the air for a considerable length of time and then back into the dye bath. Furthermore, it is obvious from this comparison, that in the Hussong machine there is a decided saving in steam and to some extent labor, and with the shorter period of handling and exposure to steam, the yarn will be in a better condition when finished.

If the machine is operated under these conditions I am sure the results will be good.

The application of the dyes is a very broad subject, and the procedure is undoubtedly largely a matter of personal opinion. A dye that is satisfactory in one dyer's judgment may not be suitable in the judgment of another, due, most often, to a difference in the method of application.

It is further the writer's opinion, after close study over a long period of time, that it is essential that dyes of equal or as near equal as possible, working characteristics should be used at all times. The most important of these characteristics is the speed of exhaustion. It is a fore-runner of trouble to use in combination dyes having widely different exhaustion speeds, unless this difference is thoroughly understood by the user, and special precautions are taken. It is the writer's candid opinion that the average dyer of today is far from being a good colorist, and it has been my experience, on various occasions to witness some very ridiculous things. The amount of material redyed in the textile industry is far too great, and represents a considerable outlay for the employer. Of course, the perfect colorist does not exist. There are many steps that can be taken to save money for the employer, and, not the least of these is the saving of dye liquor for successive batches. The Hussong machine lends itself admirably to this. The despatch with which a finished batch is replaced with another lot speaks for itself, and, let me say, there is no dye liquor like a used one for good even work. The trouble is that the average dyer today is afraid of upsetting his formula, with the result that he resorts to fresh baths and down the sewer goes a valuable combination of steam, chemicals and dyes. This is quite unnecessary and should not be tolerated. Furthermore, it detracts from the economical operation of this type of machine. It is a fact, that the loss of three good dye liquors in two days, based on a five day week, amounts to approximately a loss of $500.00 per year in coal alone, with one 300 pound machine.

As I have stated, this practice is quite unnecessary, and for the benefit of those operating Hussong machines, who have never practiced using old dye liquors over and over again, the following rules may be adopted with safety and confidence.

In wool dyeing, for successive lots, start out with two-thirds of the original chemicals, and four-fifths dyestuff as used on the first lots.

In cotton or rayon dyeing start out with two-thirds of the dyestuff, and one-half of the chemicals.

The writer assumes that the average dyer fully appreciates the fact that there are some classes of colors that cannot be used in old dye liquors, due to the fact that they must be started cold to produce good results. Fortunately, these are not numerous, excepting, I may state, in chrome colors.

A common cause of bad work is lack of proper supervision over the operation of the machine, and the carrying out correctly of all details.

It is all well and good to issue instructions with regard to the dyes, chemicals, and duration of operation, but any indifference on the part of the dyer in strictly carrying out these instructions tends to impart indifference to those operating the machines, consequently bad work is the result, and an alibi must be found. Something is wrong with the machine or the operator is at fault. Close supervision is just as important as a good machine, and no machine, no matter how efficient, should be expected to or will produce good work if its efficiency is lowered by carelessness or indifference in its operation, and such is very frequently the case.

DYEING SILK AND CHLORINATED WOOL IN MIXED FABRICS

(Continued from page 169)

ing the same percentage of acetic acid and Glauber's salt crystals as before, but the treatment is somewhat different. The temperature of the bath is held at about 110 deg. F., while the goods are run in it for 10 minutes, after which the temperature is raised to about 140 deg. F. for a run of about 35 minutes. Cool by running in cold water, add 6 per cent acetic acid, raise the temperature to 140 deg. F., and run for 30 or 40 minutes to get the desired shade.

Some topping may be necessary to bring the shade of either the wool or the silk to its proper depth, and this can be done by adding more of the dyestuff to the bath, after sampling to determine what is necessary. The silk may have to be topped in a fresh cold bath, because such a bath increases the depth of the color on silk, while a hot bath has the same effect on wool.

*Dyer and Calico Printer.

New Course

A new course, modern methods of textile testing, is being given during this semester to a number of the leading textile seniors in the Clemson Textile Department. This course is conducted by Director H. H. Willis, who has had not only considerable practical experience but who was for some nine years in charge of different phases of cotton spinning research for the U. S. Department of Agriculture.

Lactic Acid in the Textile Industry

Advantages Over Other Acids

"The cinderella of acids" would, in the writer's view, be an apt description of lactic acid, for in his opinion it is not used in the dyeing and allied industries as much as it might be, and deserves to be. Lactic acid has certain advantages over other acids, but these will be discussed later. First of all, let us see what lactic acid is and how it is made.

LACTIC acid ($C_3H_6O_3$, i. e., CH_3-$CH(OH)(COOH)$ takes its name from the Latin word for milk, it being a constituent of sour milk. It is also formed during the preparation of certain sugars, and these may be employed in its preparation, though it is more usual to use sour milk or starch for this purpose. If starch is used, then a boiled solution of starch is mixed with 5 to 10 per cent malt and kept at 65 deg. C. for a few days in wooden tanks. The mixture in the tanks (which have to be sterilized) is boiled, saltpetre and phosphates are added, and when cooled to 35 deg. C., some pure lactic ferment is added. Chalk is also occasionally added, and when the preparation no longer gives an acid reaction, it is boiled, filtered and the solution of calcium lactate is crystallized or concentrated, decomposed with dilute sulphuric acid, filtered from calcium sulphate, and the filtered lactic acid solution concentrated.

It can also be prepared in the following way: A solution of cane sugar is treated with tartaric acid, which inverts the sugar. To the inverted sugar is added sour milk and very rotten cheese (lactic ferments), which act on the inverted sugar to form lactic acid. If this acid was allowed to be present in the free state it would quickly destroy the action of the ferments. Zinc oxide is therefore added and zinc lactate formed. The solution is concentrated and treated with sulphuretted hydrogen, which precipitates the zinc in the form of an insoluble sulphide, which is removed by filtration. The remaining lactic acid is then concentrated and purified.

Commercial lactic acid is a thick, yellow or brownish fluid of about 50 per cent strength, and has a sour odor.

Lactic acid has a number of advantages. It is weaker than sulphuric, acetic, and even tartaric and oxalic acids, and has no tendering action on fibers. If cotton-containing materials are treated with solution containing lactic acid, there is no danger of the cotton becoming tender after the fabrics have been in storage for some months.

Another great boon of lactic acid is that both it and practically all its salts are readily soluble in water and the dyer is thus spared the dread of troublesome insoluble precipitates when he is using lactic acid. Calcium lactate, for instance, can easily be washed out of fabrics.

Great Reducing Power

Its great reducing power is perhaps the most remarkable property of lactic acid, and it is therefore a valuable assistant to the wool dyer. There is a great saving not only of bichrome, but also of dyestuff, when it is used as an assistant in mordanting. The colors obtained are more vivid and have greater lustre. They do not have such a tendency to run during subsequent processes and the handle is more agreeable. The dyebath is more thoroughly exhausted and then time taken is less. Lactic acid also gives very even shades.

The following recipe may be used in mordanting wool for logwood black. Besides conferring the advantages already mentioned, lactic acid causes denser, richer shades.

Bichromate of soda or potash 2½ to 3 per cent.

Lactic acid (80 per cent), 1 to 2 per cent.

More bichromate would be required if sulphuric acid were used, and the logwood bath can be about 10 per cent lower in concentration than usually, as also can the fustic extract liquor.

Lactic acid may also be employed in chroming on indigo, the resulting shade being faster to wearing and exposure.

Use with Alizarine Colors

Lactic acid is claimed to give better results than oxalic or tartaric acids when used with alizarine colors on wool or silk. The colors obtained are stated to be more brilliant and to have less tendency to alter in shade during subsequent milling operations.

The mordanting bath contains:

Aluminium sulphate .....5 per cent
Lactic acid .....5 per cent

Lactic acid has sometimes been employed in the production of discharge effects in calico printing. In many cases, however, its hygroscopic nature has an injurious effect on colors. But it is very suitable for printing on wool (except with acid colors) and has been used in place of glycerine. The double lactate of antimony and calcium has been used in mordanting cotton.

Advantages in Hat Making

Lactic acid has been found to effect a great reduction in costs of production in felt hat manufacturing. It has

(Continued on page 174)

*Dyer and Calico Printer.

Autumnal Colorings*

By **CHARLES E. SANDO**

Phytochemical and Plant Pigment Laboratory, Bureau of Chemistry and Soils, Washington, D. C.

There may be a misconception regarding the beautiful coloration of autumn leaves and the cause of the changes which gradually take place in October under normal conditions. Some believe the coloring is produced by chemical changes in anticipation of approaching cold weather and that it occurs only in leaves which cannot withstand frost. Others think that the plant, in anticipation of winter, withdraws starch or other food materials from the leaf into the branches or root stock, and that these changes precede and probably affect color formation. On one occasion the statement was broadcast that, during the growing period, the leaf contains varying quantities of red and yellow oils and that, when the leaf ceases to function, one or the other of these oils is withdrawn, leaving the leaf colored by whichever oil remains.

ALTHOUGH much research has been done on the chemistry of the pigments responsible for autumnal coloring, there are doubtless many points upon which even the specialists do not agree, but enough is known to justify a few definite statements.

The most important plant coloring matters, including those directly involved in autumnal changes, may conveniently be divided into two main groups: those occurring in plastids or organized bodies of the cell; and those occurring in the cell sap, or liquid of the cell. These two groups contain the following pigments:

Chlorophylls, the practically universal green coloring of leaves, occur in the chloroplasts and are insoluble in the cell sap. Chlorophyll *a*, which is bluish black when separated, is about three times as abundant as chlorophyll *b*, which is dark green.

Carotinoids, appearing as yellow, orange, or red pigments, occur in the chromoplasts or associated with chlorophyll in the chloroplasts. Two main carotinoids—carotin and one of its oxidation products, xanthophyll—accompany chlorophyll in green leaves, although these are known to occur in a number of isomeric modifications. From dried leaves about 1 per cent by weight of plastic pigments is obtainable. Of this, the chlorophylls constitute about 85 per cent and the carotinoids about 15 per cent. Xanthophyll is present in twice the amount of carotin. In ordinary leaves, the carotinoids are usually not in evidence because they are masked by chlorophyll. However, they may tend to modify the tint of green which the leaf exhibits.

Flavones are yellow or pale yellow pigments soluble in the cell sap, but for the most part practically insoluble in water when isolated and purified. These pigments are considered as the parent substance or chromogens from which the anthocyanins are formed. The red anthocyanins of spring leaves are believed to revert to the relatively colorless flavones, which in the autumn are again changed to the anthocyanins. The exact chemical changes involved in these conversions are not completely understood, although it has been suggested that oxidation and reduction play important roles.

Anthocyanins are red, violet, blue, and intermediate shades, and are soluble in the cell sap. The anthocyanins appearing as autumnal reds do not as a rule pre-exist in the leaves, but are formed as a direct result of metabolic changes occurring in autumn.

In autumn color changes, chlorophyll, believed to be manufactured constantly under the influence of light, is probably also undergoing decomposition during the metabolism of the cell. Under ordinary conditions the manufacture of chlorophyll is sufficient to counterbalance its decomposition, and the leaf retains its green color. Under certain conditions, such as exist in the fall, the decomposition exceeds its manufacture, and the leaf then exhibits the yellowish color of the carotinoids, which coexisted with the chlorophyll in the plastids. The products of the decomposition of chlorophyll apparently do not remain but diffuse away. While in most cases the yellow or orange shades of autumn leaves may be considered due to carotinoids, it is also possible to assume that in some cases at least such color may be due to, or modified by, flavone or flavonol-like pigments (cell-sap colors) which form golden-yellow salts. Postmortem brown colorations of leaves are very probably the oxidation products of these golden-yellow salts of flavone chromogens.

The red, violet, and purple colors of autumn leaves are due to soluble cell-sap anthocyanins (except in the case of winter reddening of certain evergreens and herbaceous plants which retain their leaves—e. g., rhodoxanthin in arborvitæ). These coloring matters are believed to be formed from preexistent flavonol glucosides. In the production of anthocyanins, light, low temperature, and an accumulation of sugar are important factors. If an injury to a branch or leaf interferes with sap circulation or translocation, autumn colors will appear prematurely. This coloration comes about when the sugar, which is being formed in the leaf, banks up because it is no longer transported to other parts. Low temperature, on the one hand, retards photosynthesis by which sugars are formed, but on the other hand, it also retards growth, starch formation, and probably translocation, thereby tending to

* Food Research Division Contribution 131.

raise the sugar content of the tissues. This line of reasoning is partly confirmed by the results of analyses, which show that more sugar is contained in red than in green leaves. Light is a very necessary factor in the production of autumnal reddening. In some plants—e. g., *Viburnum, Cornus,* and *Prunus*—autumn leaves may show quite clear photographs of the leaves covering them because anthocyanin is absent from covered surfaces.

In summary, we may say that most autumnal colors are due principally to carotinoids and anthocyanins, or to admixtures of the two. In some cases flavone pigments may tend to modify the final color effect.

Yellow autumn foliage containing carotinoids includes tulip-tree, mulberry, oriental sycamore, willow, elm, birch, chestnut, and poplar.

Red autumn and winter foliage containing carotinoids includes aloes, conifers, cypress, red-cedar, yew, arborvitæ, and saxifrage.

Autumn foliage whose colors are due to anthocyanin alone or to a mixture of anthocyanin and carotinoids includes sweetgum, dogwood, sumac, sassafras, red oak, common European maple, Norway maple, sycamore, hawthorn, pear, and bald cypress.

The statement that autumnal coloring seems to be in anticipation of cold weather might lead one to believe that color changes occur before cold weather sets in, whereas observations seem to indicate that most autumnal color changes are brought about by lessened photosynthetic activity and low temperature, both of which have a resultant effect on the general trend of metabolic activity of the leaves. Autumnal coloration is not limited to those plants which cannot withstand frost, as is evidenced by the fact that winter reddening develops in certain evergreen trees and herbaceous plants.

Changes incident to the loss of food material from the leaf may go on to a certain extent after color development, but it does not seem probable that these changes precede color formation. As a matter of fact, the most striking red autumnal color changes occur when the nights are cold and the days sunny, and while the leaves are still full of sap. Analysis has shown that red autumn leaves contain more sugar than leaves of the same species in midsummer. Starch undoubtedly disappears from the leaves in the autumn, but it is not withdrawn from the leaf as such, since it is insoluble and must be converted to soluble sugar before it can be removed to other parts of the plant.

Elect Officers

At the regular meeting of the Tompkins Textile Society, the textile students of North Carolina State College elected officers and initiated plans for their 1932 Textile Exposition and Style Show. This annual event, which attracts considerable attention, will be held at the Textile School in Raleigh on April 15.

It was announced at the meeting that five colleges had accepted the invitation to participate in the Style Show.

LACTIC ACID IN THE TEXTILE INDUSTRY

(Continued from page 172)

the advantages already stated and, in addition, when a shellac stiffening is used, there is not the same gradual action which results in the cracking of the brims. In some cases an unpleasant white deposit appears when a hat has been subjected to rain; this does not arise when a lactic dressing is used. It is stated that it takes twice as much of the best cream of tartar to do an equal amount of work as lactic acid.

When using lactic acid in the mordanting of hat felt, the material is boiled for about 30 minutes in a bath containing 2 to 3 per cent bichromate on the weight of the material and then add half as much lactic acid 80 per cent, using more, of course, if the usual 50 per cent acid is used.

Sometimes the goods are worked in a bath containing both the bichromate and the acid together. The temperature of the preparation is slowly raised from 35 deg. C to the boil.

C. Dreher considered that lactic acid could be advantageously used in the mordanting of hard milled, stock, greasy yarns, etc.

To the cleaner, lactic acid is of interest for removing ink stains.

In cotton finishing, sizing materials containing rice or wheaten flours are made more soluble by mixing them with a little lactic acid a day or two before they are required. A firmer finish is obtained.

Silk manufacturers often make use of lactic acid. It is not, of course, so important as in wool dyeing, where it is chiefly used as an assistant in mordanting; moreover, its color makes the producer of white or light shades rather chary of using it.

Some authorities recommend it for scrooping silk, but others say that its use in this respect is not desirable.

It has been used with good results in breaking down of boil-off liquor for dyeing silk goods, a gallon of 50 per cent acid being used to 250 gallons of liquor.

To conclude, we will compare the chief properties of lactic acid with those of other acids.

Lactic acid has these chief advantages over:

(1) Sulphuric acid—
It does not form insoluble precipitates;
It does not tender vegetable fibers.

(2) Tartaric acid—
Is weaker, but a much more powerful reducing agent.

(3) Oxalic acid—
Is weaker, but a more powerful reducing agent;
Is non-poisonous.

(4) Acetic acid—
Is non-volatile;
Gives faster, richer shades.

PROGRESS IN BLEACHING, DYEING AND FINISHING

(Continued from page 142)

sults obtained with this fibre by the Wool Industries' Research Association at Leeds. At one time it appeared that there would be no rival to cellulose as a raw material for the manufacture of rayon, but now it has been shown that cuprammonium solutions of wool can be spun into artificial fibres having characteristic properties.

J. B. Speakman (J. Text. Inst., 1931, 22, 339T) has dealt with the felting of wool. The assumption that felting is due solely to an interlocking of the wool scales is no longer supported, and the view is suggested that felting occurs because the frictional resistance to movement of a wool fibre in a mass of fibres is smaller in the direction of the root-end than in a direction towards the fibre tip. Speakman has described a method and apparatus for measuring this difference of resistance and partially correlated it to the felting properties of various wools. But it is pointed out that other factors must enter into this process, and, no doubt, interesting information concerning these will shortly be published.

Wool is particularly subject to mildew troubles, and these have been thoroughly investigated by the Wool Industries' Research Association. Wool is not readily attacked by bacteria, since it is seldom sufficiently moist to promote such attack. But owing to the large amount of nutriment usually present in wool it is a favorable medium for the growth of mildew. Naturally all processes which tend to remove this nutriment matter assist the resistance of the fibre against mildew attack. As antiseptics, sodium fluoride and sodium silicofluoride have been found satisfactory. It is also interesting to note that Shirlan (the anilide of salicylic acid, a substance which has been found especially suitable for protecting cotton from attack by mildew) is an effective antiseptic when applied to wool materials.

R. Burgess (J. Soc. Dyers and Col., 1931, 47, 96) has made notable contributions to the behavior of wool towards bacteria and mildew. Factors which influence the damage caused to wool by "woolly bear" during storage in Eastern countries have been discussed by H. C. Hartley (Wool Record, 1930, 39, 203), but there appears to be some doubt as to whether or not added oils present in wool tops increases the resistance of the wool to attack by "woolly bear."

Weighting of wool is not extensively practiced, as in the case of silk, but quite an interesting research on this subject has been published by S. R. Trotman and W. Savory (J. Soc. Chem. Ind., 1931, 50, 299T). It is possible to weight satisfactorily with gelatine tannate, but even more important is the fact that wool shows a marked affinity for various aromatic sulphonic acids, which can be added to the usual dyebath, so that dyeing and weighting can be effected simultaneously.

In this review it has not been possible to make reference to many interesting developments and researches, but it is anticipated that the effects of these and those noted above will in due course exert a definite influence on technical processing of textile materials.

NEW PATENTS

(*Abstracted by the Synthetic Organic Chemical Mfrs. Assn.*)

Art of Preparing Nitrocelluloses and Raw Material Therefor. (Relates to the art of nitrating cellulose fiber to produce a product intended for use in the manufacture of films, lacquers, artificial silk, and the like, its object being to make possible a high yield of good quality product having a low acid retention.) Milton O. Schur and Benjamin G. Hoos, of Berlin, N. H., assignors to Brown Co., of Berlin, N. H., No. 1,833,955, December 1, 1931.

Printing Paste and Process of Producing the Same. (Relates to new salts of sulfonated unsaturated aliphatic acids and mixtures thereof and more particularly, to ricinoleic acids, such as sulfo-ricinoleic acids, and organic bases, to be used as solvents and emulsifying agents in printing pastes.) Jean Georges Kern and Charles I. Sala, of Wilmington, Del., assignors to E. I. duPont de-Nemours & Co., of Wilmington, Del., No. 1,834,314, December 1, 1931.

Gallocyanine Dyestuffs. (For example, the dyestuff obtainable by the action of nitrosotetramethyl-metaphenylenediamine on gallamide, yielding in chrome printing bluish-violet shades of good fastness to chlorine and soap.) Ernst Hug and Heinrich Werdenberg, of Neu-Allschwil, near Basel, Switzerland, assignors to Durand & Huguenin S. A., of Basel, Switzerland, No. 1,834,620, December 1, 1931.

Keep your machine in good order. If repairs are necessary, make them. This precaution will save trouble and will save money for the employer. It is not reasonable to expect good work from a neglected or abused machine. I have seen machines that were pitiful sights. In this connection the employer is largely to blame, by his failure to make repairs when informed of the need of them. In order to do the best work, keep your machines in first-class condition.

Another point I would like to mention is repeated attempts by dyers and employers to use the same machine for dyeing both cotton and wool. This cannot successfully be done, and the sooner the fact is realized, the quicker trouble resulting therefrom will cease. If you are dyeing both animal and vegetable fibres, you should be equipped with the necessary machines. Of course, if the machines are of suitable metal construction, the difficulties when dyeing both fibres in the same machine are minimized.

Production of Dyestuff Intermediates. (Relates to improved or modified processes for the production of dyestuff intermediates and more particularly the production

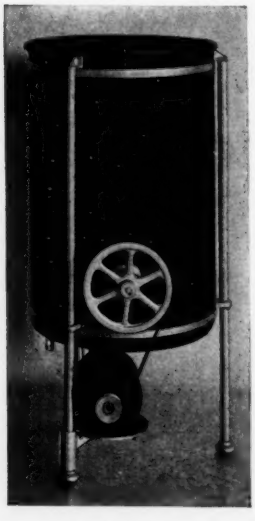
of dianthraquinonyl derivatives containing chlorine, bromine or sulphonic acid groups in the 2:2' positions.) William Smith and John Thomas, of Grangemouth, Scotland, assignors to Scottish Dyes Ltd., of Grangemouth, Scotland, No. 1,834,876, December 1, 1931.

New Monoazodyestuffs. (Prepared by coupling a 2-phenyl-indol-sulfonic acid with an amine of the aromatic series. Dye wool yellow to orange shades of excellent fastness to light and fulling.) Winfrid Hentrich of Wiesdorf-on-the-Rhine, and Rudolf Knoche, of Leverkusen-on-the-Rhine, and Fritz Ballauf, of Elberfeld, Germany, assignors to General Aniline Works, Inc., of New York, N. Y., No. 1,835,393, December 8, 1931.

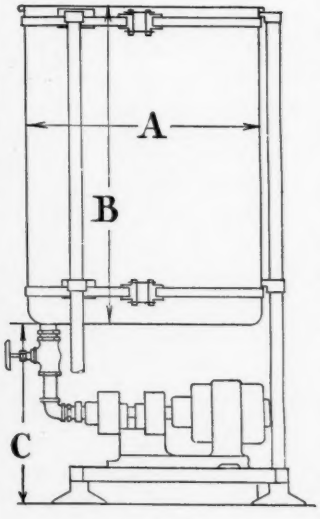
Process for Purifying Vat Dyestuffs of the Anthanthrone Series. (Comprises treating a halogenated anthanthrone with sulfuric acid of 80-95% strength, separating the unsoluble sulfate from the mother liquor and decomposing the sulfate by means of water.) Richard Herz, of Frankfort-on-the-Main, and Werner Zerweck, of Frankfort-on-the-Main-Fechenheim, Germany, assignors to General Aniline Works, Inc., of New York, N. Y., No. 1,835,396, December 8, 1931.

Pfaudler Dye Mixers

Two models of the Pfaudler mixers are herewith illustrated. The Model BT Stationary Mixer is equipped with a high speed propeller agitator which is located through the side wall near the bottom and is motor-driven. Rapid and complete solution of dyestuffs and



Model BT



Model PT

other solids is assured by the manufacturer, with consequent elimination of unstandardized batches. The substitution of mechanical for hand mixing results, the manufacturers say, in decided savings in labor.

The Model PT with pump discharge is a model T tank equipped with a motor driven centrifugal discharge pump with a capacity of ten gallons per minute, permanently built into the tank support assembly. This design permits discharge of the tank contents from the floor level directly into the dye kettle, eliminating hand labor for bailing or drainage.

Catalogues may be obtained from the Pfaudler Co., Rochester, N. Y., listing the specifications of these and other mixers and tanks.

Joins National Oil Products Co.

Noted for his advanced work in the field of industrial chemistry and for a long list of papers published in book form and trade magazines, Dr. Dale S. Chamberlin, B.Ch.E., M.S., D.I.C., has joined the research staff of National Oil Products, Harrison, N. J.

Dr. Chamberlin has had considerable experience in the industrial world and comes to NOPCO after connections with many concerns and as a lecturer at various institutions.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED

Experienced dyestuff salesman, also demonstrator, desires connection. Would consider taking charge of a dye-house.

Thoroughly experienced dyeing yarns, raw stock, hosiery, rayons.

Acquainted in Southern territory, also familiar with mills in Massachusetts and Rhode Island. Satisfactory references.

Address Box No. 717, American Dyestuff Reporter, 440 Fourth Avenue.

POSITION WANTED

New Bedford Textile School graduate. Wide laboratory and dyeing experience on cotton, rayon and silk fabrics. Recently Chief Chemist for large package dyeing concern handling all types of colors. Six years' experience, best references. Address Box No. 718, American Dyestuff Reporter, 440 Fourth Ave., New York City.

SALESMAN

For dyestuffs, chemicals, oils in New Jersey dye houses, open for a new proposition. Well known with customers. Good references. Salary basis. Address Box No. 719, American Dyestuff Reporter, 440 Fourth Avenue, New York City, N. Y.

1932

de-
the
hand

Co.,
and

strial
book
erlin,
ff of

ce in
nnec-
arious

column
ertion.
l, ma-
n inch

r, de-
of a

k, ho-

with
actory

porter,

labora-
lk fab-
dyeing
experi-
nerican
City.

houses,
tomers.
o. 719,
e, New